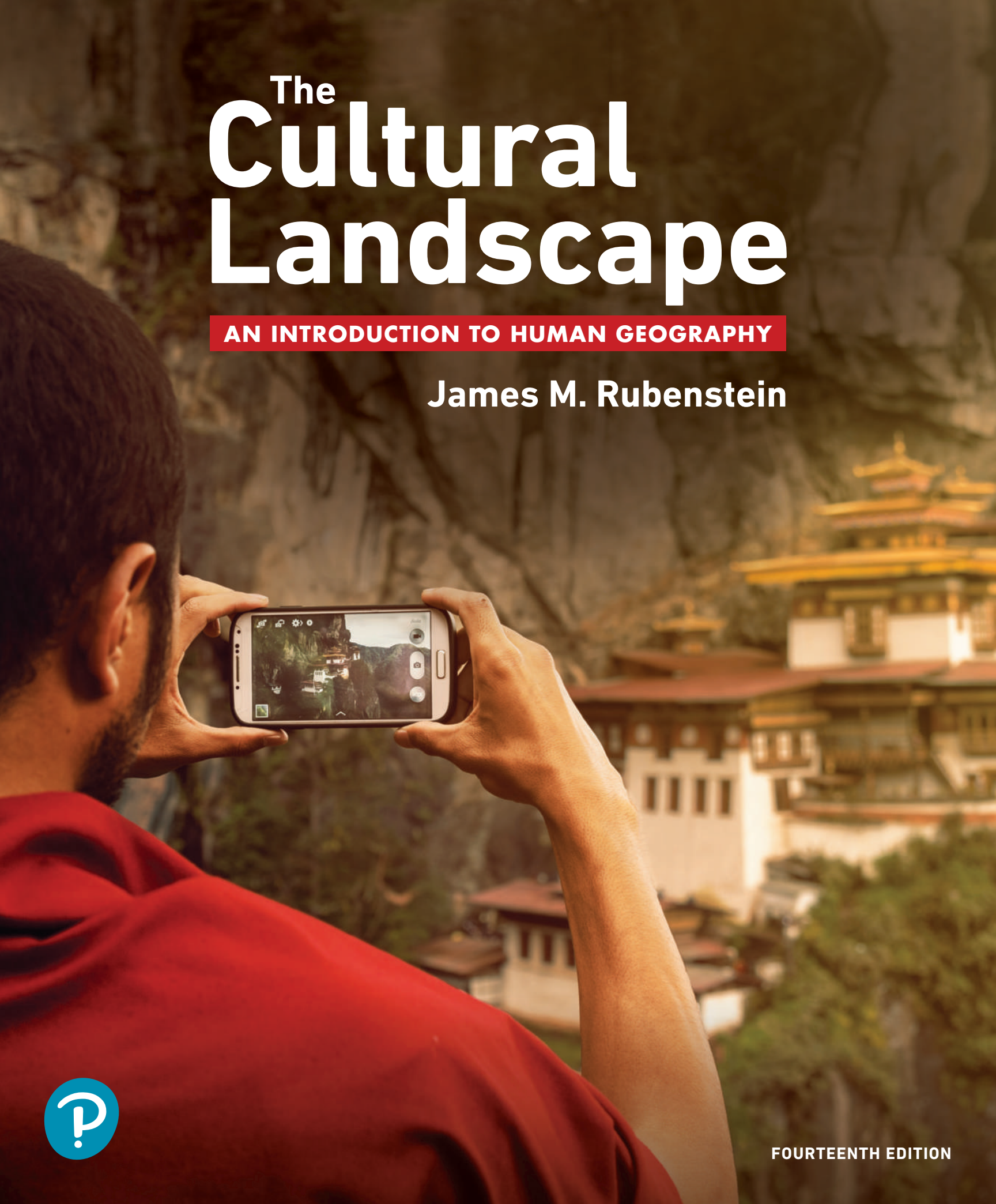
The Cultural Landscape

AN INTRODUCTION TO HUMAN GEOGRAPHY

James M. Rubenstein



FOURTEENTH EDITION

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THE CULTURAL LANDSCAPE

An Introduction to Human Geography

James M. Rubenstein

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Pearson

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Library of Congress Cataloging-in-Publication Data

Cataloging-in-Publication Data is available on file at the Library of Congress.

ScoutAutomatedPrintCode

Pearson

ISBN-10: 013-791735-X
ISBN-13: 978-0-137-91735-8

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PREFACE

Geography is the study of where things are located on Earth's surface and the relationships between people and those locations. According to the American Association of Geographers, geography is the study of the complex, unfolding relationships between people and the land they live on. In other words, where are people and activities located across Earth's surface? Why are they located in particular places? *The Cultural Landscape* seeks to answer these questions as they relate to our contemporary world. The book provides an accessible, in-depth, and up-to-date introduction to human geography for majors and non-majors alike.

New & Enhanced Features

This edition brings substantial changes in both organization and content, as well as updated information and data. Especially important is the consideration of digital as well as paper versions of the book. This book has been designed to be legible – and attractive – in either paper or electronic format. Several features integrated into the text enhance student understanding and analytic skills.

- **NEW Visual material** Geography is a visual science. The current edition includes more than 1,000 figures, 7 percent more than the 13th edition, which in turn had 19 percent more than the 12th edition.
- **UPDATED Summary & Review** appears on the printed page or digital spread immediately following the final text material. This feature outlines as bulleted items the key points made in each of the chapter's four Key Issues.
- **UPDATED Thinking Geographically** questions consist of several visual and thought-provoking "essay-style" questions at the end of each chapter, suggesting directions for further reflection, based on concepts and themes developed in the chapter. The feature includes an image designed to illuminate the thought or suggest directions for reflection.
- **UPDATED Geospatial Analysis** activities leverage GIS-inspired MapMaster in Mastering Geography, allowing students to analyze spatial patterns and data at regional and global scales through overlaying multiple maps. The fully-mobile interactive maps have enhanced analysis tools, such as split screen, bivariate mapping, data probing, map styling, and data filtering. Students can geolocate themselves in the data and upload their own data for advanced mapmaking. MapMaster includes zoom and annotation functionality, with hundreds of map layers leveraging recent data from sources such as the PRB, the World Bank, NOAA, NASA, USGS, United Nations, the CIA, and more.
- **NEW International Geographic Mapping Explorations** features have students investigate in more detail a concept or place discussed in the chapter and answer questions based on their observations.
- **UPDATED Word clouds**, on the first page of each chapter visually depict the most important concepts and terms to be addressed in the chapter.
- **UPDATED Location maps** present a spatial overview of each chapter, identifying select places explored in each chapter's applications and case studies.

New & Enhanced Organization

A long-time strength of this book has been its clear, easy-to-use organization and outline. Electronic versions of the books now coexist with traditional paper format, formatted to facilitate reading on tablets and computers without compromising the pedagogic strengths of traditional paper formats. Valuable organizational features established in previous editions have been retained and considerably strengthened for this electronic age through the addition of several new features.

Chapter opening. Each chapter opens with an introductory paragraph, as well as an outline of four key issues along with one or two sentences previewing the key issue. The opener also has a word cloud and location map.

Key issues. Each chapter is organized according to an outline based on the four key issues.

Key issue introduction. The page in which a key issue begins is numbered in accordance with the chapter and key issue number (such as Key Issue 3.1) Immediately following the title of the Key Issue is a paragraph that introduces the key issue.

Key issue topics. Each Key Issue is divided into several principal topics. Each topic is always introduced by a prominent title. In the print version, the topic title always appears at the top of each even-numbered page.

Self-contained spreads. Each topic is divided into several subtopics. In the print version, a new subtopic begins at the top of each odd-numbered page.

Placement of figures. Maps and photos appear next to where they are discussed in the text. No more going

through a chapter to find a figure that has been referenced in one location but actually appears somewhere else.

Learning outcome. Immediately below the title of each Key Issue topic is a Learning Outcome that summarizes the principal purpose of that topic.

Pause & Reflect. Each topic includes a Pause and Reflect feature that is presented as a question. Each question is designed to stimulate further reflection or discussion on the material being presented in the spread.

End of chapter. Each chapter ends with a variety of features that review content and offer opportunities for the reader to undertake additional exploration. End of chapter material includes Summary & Review, Thinking Geographically, Key Terms, and International Geographic Mapping Explorations.

New & Enhanced Content

Human geography is a dynamic subject. Topics that were central to the discipline a generation ago have faded in importance, while new ones take their place. Each chapter naturally provides updates of the most recently available data. Below are examples of entirely new material included in each chapter.

What Basic Concepts Do Geographers Use?

The first portion of the book welcomes students to the study of human geography and introduces basic concepts that geographers use. Geographers employ several concepts to describe the distribution of people and activities across Earth, to explain reasons underlying the observed distribution, and to understand the significance of the arrangements.

Chapter 1 ***(This is Geography)*** provides an introduction to ways that geographers think about the world. Geography's five most basic concepts (place, region, scale, space, connection) are introduced through examples from Wuhan, China, where COVID-19 was first identified. New material introduces contemporary issues of concern to geographers, including patterns in space informed by gender identity and Black Lives Matter.

An expanded discussion of mapping, GIScience, and geocoding now explains differences among choropleth, isoline, graduated symbol, dot distribution, and cartogram maps, using U.S. COVID-19 case patterns as examples. A discussion of sustainability includes new information on Louisiana's Cancer Corridor and climate change risks.

Where Are People Located in the World?

Why do some places on Earth contain large numbers of people or attract newcomers whereas other places are sparsely inhabited? Chapters 2 and 3 examine the distribution and growth of the world's population, as well as the movement of people from one place to another.

Chapter 2 ***(Population & Health)*** reflects the important demographic trends of the twenty-first century. World population is growing at the slowest rate since the seventeenth century. China – the world's most populous country since ancient times – is now experiencing population decline. India is surpassing China as the world's most populous country, but population growth has slowed dramatically there as well. Meanwhile, health issues – including COVID-19, mpox, and HIV/AIDS – have become far more prominent in the geography of population.

Chapter 3 ***(Migration)*** includes contemporary examinations of the U.S.-Mexico border and the surge of migrants into Europe from Africa and Asia. The principal reasons for long-distance migration – environmental, political, and economic – are illustrated with new examples, including rising seas in Alaska and the massive forced migration of millions of Ukrainians after the Russian invasion.

How Are Different Cultural Groups Distributed?

Geographers look for similarities and differences in the cultural features at different places, the reasons for their distribution, and the importance of these differences for world peace. Chapters 4 through 8 analyze the distribution of different cultural traits and beliefs and the political challenges that result from those spatial patterns.

Chapter 4 ***(Culture & Social Media)*** includes an entirely new section on tourism and overtourism, as well as various approaches to responsible and eco-friendly tourism. The chapter increasingly emphasizes the central role that social media plays in contemporary culture, and the usefulness of geographic concepts in understanding features of social media. Regional differences are described in the use of the most popular social media, including YouTube, Instagram, Whatsapp, and other social media platforms. Also described is the distribution of attacks on the use of social media by governments and criminals.

Chapter 5 ***(Languages)*** uses *Ethnologue's* latest classification of languages into just three main groupings: institutional, stable, and endangered. As per *Ethnologue*, stable languages are divided into developing and vigorous, and endangered languages are divided into threatened and dying. Examples of each are provided.

Chapter 6 ***(Religions)*** has been substantially reorganized and rewritten, incorporating extensive detailed input from some of the nation's leading authorities on the geography of religions, as well as individual religions. In accordance with authorities, the world's religions are classified as the three largest universalizing religions, the three largest ethnic religions, nine other religions with at least 3 million adherents, and nonreligious people. Further, in accordance with authorities, the largest ethnic religions are now identified as Hinduism, Chinese folk religions, and ethno-religions.

Chapter 7 ***(Ethnicities)*** reflects the current preference for use of the term *Black person* instead of *African American* in the United States. As a result, clarifying the difference between the terms ethnicity and race becomes even more essential in understanding geographic distributions. Presidents Biden, Trump, and Obama illustrate the diversity of ethnic identity in the United States. The Black Lives Matter movement is presented with several examples from professional sports.

Chapter 8 ***(Political Geography)*** has been reorganized to discuss geographic structure such as boundaries and shapes of states, prior to threats such as nuclear weapons and terrorism. Unitary and federal states are now discussed in the first key issue, whereas challenges in defining states are now discussed in the fourth key issue. The third key issue includes examples of gerrymandering following the 2020 census. The principal terrorist groups discussed in the fourth key issue have changed, as some groups have expanded attacks whereas others have fewer. The fourth key issue also includes threats to democracy through increased attacks on the freedom of the press.

How Do People Earn a Living in Different Parts of the World?

Chapters 9 through 13 turn to economic elements of human geography. Over the years, the economic geography component of human geography has proved the most challenging for students. The order of chapters 9 and 10 has been reversed. The internal organization of chapters 10, 11, and 12 has changed sharply, and new material has been introduced to help students relate more closely to economic geography concepts.

Chapter 9 ***(Development)*** now introduces the four chapters covering economic geography material, instead of positioned after agriculture in the previous edition. The United Nations has introduced three new indexes to measure progress in development: Gender Social Norms Index, Multidimensional Poverty Index, and Planetary Pressures-adjusted Human Development Index. These join the existing Human Development Index, Gender Development Index, Gender Inequality Index, and Inequality-adjusted Human Development Index. With so many indexes to discuss, this chapter emphasizes the significance of the indexes, rather than simply present the statistics. Pakistan is used as an example to relate these many indexes to actual conditions.

Chapter 10 ***(Food & Agriculture)*** now follows the chapter on development. The chapter's outline has been altered to start with global patterns of food consumption, a topic that students will hopefully find more familiar than starting with patterns of food production. The second key issue is now organized around the three agricultural revolutions: (1) origin of agriculture, (2) productivity gains during stage 2 of the demographic transition, and (3) the recent green revolution. The third key issue, which addresses the distribution of different agricultural practices, now begins with the principal agriculture regions in developed countries, as these may be more familiar for most students than the regions in developing countries.

Chapter 11 ***(Industry)*** now focuses on manufacturing; material related to energy and pollution has been moved to a new Chapter 14. The first key issue focuses on the development and distribution of industry. The three site factors are discussed in the second key issue, and the two main situation factors are discussed in the third key issue. The changing distribution of industry worldwide and within industrial regions is discussed in the fourth key issue. To help students relate to industrial location, the chapter presents the journey of production of a T-shirt to illustrate site factors, how a car is made to illustrate situation factors, and the journey of iPhone production to illustrate the changing distribution of world industrial production.

Chapter 12 ***(Settlements & Services)*** is substantially reorganized. The first key issue now describes the distribution and growth of settlements, a reflection of now placing *Settlements* first in the chapter title. The second key issue examines rural settlements and early urban settlements as a way to introduce the concept of *services*. The third key issues focuses on business services, which are disproportionately clustered in large settlements. Finally, the most challenging component of services – namely central place theory underlying the distribution of consumer services – is placed at the end of the chapter rather than at the beginning, as in past editions.

Chapter 13 ***(Urban Patterns)*** begins with recent changes in defining urban areas in the United States. The growth of suburbs is brought forward to the first key issue. The discussion of the distinctive features of the central business district now uses Louisville, Kentucky, as a case study. The next two key issues apply the models of internal structure to cities in developed countries and then to cities in developing countries. The fourth key issue focuses on urban transportation.

How Are Earth's Resources Distributed?

Geography is both a social science and a natural science. Although focusing on human geography, the book concludes with a new Chapter 14 concerned with an understanding of the impact on human activities of resources in the environment.

Chapter 14 ***(Resource Challenges)*** is divided between energy resources in the first two key issues and pollution of resources in the third and fourth key issues. The first key issue examines the distribution of fossil fuels supply and demand. The second key issue of this new chapter reviews alternative energy sources that are beginning to replace fossil fuels. The third key issue of this new chapter

is organized around the three main types of pollution: air, water, and solid waste. The final key issue of the book discusses pollution reduction strategies that can lead to a more sustainable future. The book concludes with a review of the five key geographic concepts introduced at the beginning of the book, and applies the concepts to two small very different countries – Luxembourg and Timor-Leste.

New & Enhanced Graphics

The main purpose of this book is to introduce you to the study of geography as a social science by emphasizing the relevance of geographic concepts to human problems. It is intended for use in college-level introductory human or cultural geography courses. The book is written for students who have not previously taken a college-level geography course.

Human geography is distinguished from other social sciences by its reliance on communicating through visual material. As a visual science, geography's most fundamental tool is the map. This book has been prepared with the visual material front and center.

We live in an electronic age. This book has been designed to be equally usable – and attractive – in both paper or digital formats. Most books are still composed in pages designed for paper – as in the past – and converted to electronic format after printing of the paper version. As a result, the conversion to electronic format is frequently awkward. For example, maps and photos are often placed in the paper version in positions that don't work well in electronic format.

Not only is this a good-looking human geography textbook, it is also the best-designed book for electronic reading. Furthermore, within the book, some of the learning will take place through accessing information online.

We live in a visual age. This book has been composed in the reverse order of traditional textbooks. A traditional book has the text written first and the graphic material is added later almost as an afterthought. Instead of beginning with an author's complete manuscript, this book starts with an outline and a visual concept for each page of the printed version. What would be the most important geographic idea presented on the page, and what would be the most effective visual way to portray that idea? The maps, graphs, and photos are placed on the page first, and the text is written around the graphics. From the outset, the text is written to complement the graphics. As a result, the digital version of this book is much easier to use than books that are converted after the fact from print to digital. Consistent with the importance of visuals, this edition has 7 percent more figures than the previous edition, which in turn had 19 percent more figures than the edition prior to that.

New & Enhanced Relevance

Many speculated that geography would be irrelevant in the twenty-first century. Geography's future was thought to be grim because the diffusion of electronic communications and social media would make it easier for human activities to be conducted remotely. If any piece of information could be accessed from any place in the world (at least where electronic devices work), why live, shop, work, or establish a business in a crowded city or a harsh climate?

In reality, geography has become more, not less, important in people's lives and the conduct of business. Here are several ways that location matters more now than in the past, because of – not despite – the diffusion of electronic devices:

Geographical smartphone apps. Smartphones and other electronic devices match specific demand to supply in a particular locality. For example: Restaurant apps match hungry people to empty seats in a locality's restaurants. Real estate apps help people find housing for sale or for rent in a locality. Social apps let people know where their friends in a particular locality are hanging out that night. Transportation apps match vehicles with available seats to people trying to get to specific locations. These sorts of apps generate data on people's preferences in space, which in turn helps even more location-based business get started and grow. Instead of looking for restaurants in printed "Yellow Pages," we find places to eat that are mapped on our device and in our locations. No wonder that geography apps, in the form of maps (including navigation) and travel (including transportation), rank among the five most frequently used services on smartphones.

Navigation. Electronic devices are essential to the smooth movement of people and goods. For example: Turn-by-turn information can prevent you from getting lost or steer you back if you do get lost. Traffic jams on overcrowded roads can be avoided or minimized. Vehicles in the future will be driverless, so you can spend driving time working, learning, or social networking. Instead of turning on a radio to hear traffic information, we look at the red and green traffic flow patterns on an electronic map.

Ideas. The people who make all of these new location-based apps are themselves highly clustered in a handful of places in the world, such as the San Francisco Bay Area. Ideas – both brilliant and farfetched – are still easier to communicate face-to-face than across long distances. Living and working in places like Silicon Valley, despite high expenses and choking traffic jams, put people next to other like-minded innovators in the electronic-based geography of the twenty-first century.

Cultural diversity. Electronic devices also impact the changing geography of cultural diversity. What if you searched for an available restaurant table in a foreign language? Would you find the same places? What if you conducted an internet search in a foreign country? Would you find the same information?

The Publishing Team

The steps involved in creating most traditional textbooks haven't changed much. The book passes from one to another like a baton in a relay race. The author writes a manuscript, which then passes in turn through development, editing, and production specialists on the way to the printing press. The preface typically includes a perfunctory litany of acknowledgments for the many fine people who contribute to the development, editing, and production of the book.

In contrast, this book starts as a genuine partnership among the key development, editorial, and production teams. The traditional separation of development, editorial, and production has been deliberately blurred.

Aileen Pogran, Content and Product Manager at Pearson Education, is the captain of this team. The relationship between author and editor is very special and is essential for successful publishing. In the short time that Aileen and I have worked together, we have quickly established that special relationship. A close relationship between author and editor has been especially important in recent years, as the COVID-19 pandemic forced more interaction into video conferencing.

After substantial reorganization at Pearson, Aileen assumed responsibility for product management for the most recent edition of Contemporary Human Geography. This year she was both product manager and content manager for this edition of The Cultural Landscape. Aileen has taken over responsibility for life sciences at Pearson but has retained leadership for The Cultural Landscape.

Susan Teahan, Developmental Editor, plays a more central role than the title suggests. A development editor typically provides assistance primarily at the early stage of writing the manuscript. In contrast, Susan has been an integral part of the team all the way through to final page proofs. How can each and every page of the printed book and the digital version look their best? How can the text and the figures work best together? These are examples of Susan's leadership that goes above and beyond what a typical development editor does.

Kevin Lear, Senior Project Manager at International Mapping, and his team produce the outstanding maps for this book. Back in the 1980s, Kevin was the first cartographer to figure out how to produce computer-generated full-color maps that are more accurate and more attractive than hand-drawn ones. Now in the 2020s, Kevin has taken on even more responsibilities for assuring that the art work is accurate, attractive, and up-to-date.

Titas Basu, Content Producer and Team Leader at Pearson Education, serves as ringmaster. She has the job of juggling all of the editorial and production responsibilities so that everything is in the right place at the right time among multiple stakeholders.

Mary Tindle, Content Producer & Project Manager at Straive, oversees the production of the print and digital versions of the book. Straive is especially adept at balancing the distinctive needs of a traditional print-based product with the contemporary alternative of a digital product. Mary smoothly manages the flow of copyediting and other production tasks for this project.

Special thanks go to several other folks. Adam Gleim teaches several sections of AP Human Geography at Lakota West High School near Cincinnati. He was a font of great ideas for making material more accessible for students, especially the economic geography portion of the course. Erika Nelson was a research assistant at the start of the project, until she had to withdraw to handle a family tragedy. Stuart Jackman, longtime Design Director at DK Education, created the principal visual elements for the 12th edition of the book, many of which have been retained here.

Reviewers

I would also like to extend a special thanks to all of my colleagues who have, over the years, offered a good deal of feedback and constructive criticism. Colleagues who served as reviewers are: Reuben Allen (Ball State University), Sarah Bednarz (Texas A&M University), Sharon Cobb (University of North Florida), Martha Geores (University of Maryland, College Park), Christopher Hall (Davis School District, Davis, Utah), Institute for Curriculum Services, Richard Katz (Roosevelt High School, Seattle, Washington), David Keeling (Western Kentucky University), Ann Linsley (Bellaire High School, Bellaire, Texas), Shawn Mitchell (University of South Alabama), Lili Monk (Walter Johnson High School, Potomac, Maryland), Carrie Mott (Rutgers University), Gordon Newby (Emory University), Bimal Paul (Kansas State University), William Pitts (Baylor University), Timothy Scharks (Green River College), Heather Sharkey (University of Pennsylvania), Thomas Shaw (Central High School, Louisville, Kentucky), Spencer Swindler (Mallard Creek High School, Charlotte, North Carolina), Sigismond Wilson (Rogers State University), and Tom Wurst (Magnolia West High School, Magnolia, Texas).

DIGITAL & PRINT RESOURCES

For Students & Teachers

This edition provides a complete human geography program for students and teachers.

Mastering Geography **with Pearson eText for *The Cultural Landscape***

The Mastering platform is the most widely used and effective online homework, coaching, and assessment system for the sciences. It delivers self-paced coaching activities that provide individualized coaching, focus on course objectives, and are responsive to each student's progress. The Mastering system helps teachers maximize class time with customizable, easy-to-assign, and automatically graded assessments that motivate students to learn outside of class and arrive prepared for lecture. Mastering Geography offers:

- **Assignable activities** that include GIS-inspired MapMaster™ interactive maps, videos, end-of-chapter questions, reading quizzes, *Test Bank* questions, map labeling activities, and more.
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  www.pearson.com/mastering/geography

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For Students

Practicing Geography: Careers for Enhancing Society and the Environment

(9780321811158)

This book examines career opportunities for geographers and geospatial professionals in business, government, nonprofit, and educational sectors. A diverse group of academic and industry professionals share insights on career planning, networking, transitioning between employment sectors, and balancing work and home life. The book illustrates the value of geographic expertise and technologies through profiles and case studies of geographers at work.

Dire Predictions: Understanding Climate Change, 2nd edition, by Michael Mann and Lee R. Kump

(9780133909777)

Periodic reports from the Intergovernmental Panel on Climate Change (IPCC) evaluate the risk of climate change brought on by humans. But the sheer volume of scientific data remains inscrutable to the general public, particularly to those who may still question the validity of climate change. In just over 200 pages, this practical text presents and expands upon the essential findings of the IPCC's 5th Assessment Report in a visually stunning and undeniably powerful way to the lay reader. Scientific findings that provide validity to the implications of climate change are presented in clear-cut graphic elements, striking images, and understandable analogies. The **Second Edition** covers the latest climate change data and scientific consensus from the IPCC Fifth Assessment Report and integrates links to online media. The text is also available in various eText formats, including an eText upgrade option from Mastering Geography courses.

ABOUT THE AUTHOR

Dr. James M. Rubenstein received his B.A. from the University of Chicago in 1970, M.Sc. from the London School of Economics and Political Science in 1971, and Ph.D. from Johns Hopkins University in 1975. He was a Professor of Geography at Miami University for 37 years, where he taught urban and human geography. Dr. Rubenstein is now a full-time writer. In addition to this book, Dr. Rubenstein is the author of *Contemporary Human Geography* (5th edition) as well as co-author of *Introduction to Contemporary Geography*, both published by Pearson Education. He also conducts research in the automotive industry and has published four books on the subject – on the subject – *The Changing U.S. Auto Industry: A Geographical Analysis* (Routledge); *Making and Selling Cars: Innovation and Change in the U.S. Auto Industry* (The Johns Hopkins University Press); *A Profile of the Automobile and Motor Vehicle Industry: Innovation, Transformation, Globalization* (Business Expert Press); and *Who Really Made Your Car? Restructuring and Geographic Change in the Auto Industry* (W.E. Upjohn Institute, with Thomas Klier). He also writes a weekly column about local food for *The Oxford Press*. Winston, a lab-husky mix with one brown eye and one blue eye, took Dr. Rubenstein for long walks in the woods most days for 15 years. Sadly, Winston passed away at age 15 a few months before the completion of this book.

DEDICATION

This book is dedicated to my wife Bernadette Unger, the love of my life, and my companion through life. I also want to remember my mother Frances Rubenstein and several other relatives who passed away during the darkest days of the COVID-19 pandemic lockdown.

ABOUT OUR SUSTAINABILITY INITIATIVES

Pearson recognizes the environmental challenges facing this planet, as well as acknowledges our responsibility in making a difference. This book is carefully crafted to minimize environmental impact. The binding, cover, and paper come from facilities that minimize waste, energy consumption, and the use of harmful chemicals. Pearson closes the loop by recycling every out-of-date text returned to our warehouse.

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In 2015, Pearson formally adopted The Global Goals for Sustainable Development, sponsoring an event at the United Nations General Assembly and other ongoing initiatives. Pearson sources 100% of the electricity we use from green power and invests in renewable energy resources in multiple cities where we have operations, helping make them more sustainable and limiting our environmental impact for local communities.

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https://www.pearson.com/corporate/sustainability.html

Photographing Paro Taktsang by smartphone (Photographer: Debdatta Chakroborty). Paro Taktsang, also known as Tiger's Nest, is a Buddhist Monastery constructed on a sheer cliff next to a hillside cave 900 meters (3,000 feet) above the Paro valley in Bhutan. The monastery, which was built in 1692, may have named Tiger's Nest, because, according to a local legend, Padmasambhava (also known as Guru Rinpoche) – the man who introduced Buddhism into Bhutan – was carried to the cave on the back of a tiger. Most of the people in Bhutan are Buddhist, one of the world's major religions. Bhutan is one of the world's most remote and least familiar countries. If Bhutan was a U.S. state, its population of around 782,000 would rank it 46th, ahead of only Wyoming, Vermont, Alaska, and North Dakota, and its land area of around 38,000 square kilometers (15,000 square miles) would rank it 42nd, ahead of Maryland. Its isolation has helped Bhutan retain many distinctive cultural traditions, such as food and clothing. Nonetheless, contemporary cultural features have reached Bhutan. For example, 97 percent of Bhutan's residents have smartphones, and half regularly use the internet and Facebook. Bhutan is a world leader in environmental protection. Nearly half of the country's land area is protected from development, and corridors link protected areas so that animals can migrate freely. The country generates nearly all of its electricity through renewable sources, such as hydroelectric dams. *The Cultural Landscape* explores the patterns and processes behind the human geography of places like Bhutan. The book looks at where people and activities are located on Earth, the reasons that people and activities are located in distinctive patterns, and the processes underlying these distinctive patterns. Every place on Earth – like Bhutan – is in some ways unique and in some ways a part of an interconnected world.

THE CULTURAL LANDSCAPE

James M. Rubenstein

1 This Is Geography

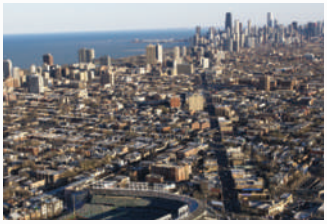
KEY ISSUES

1.1 Why Is Geography a Science?

Geography is the study of where people and activities are found on Earth's surface and the reasons why they are found there. Geographic tools are essential for delivery of online services through electronic devices.

1.2 Why Is Every Place Unique?

Geographers understand why each place on Earth is in some ways unique. Each area or region on Earth also possesses a unique combination of features.



1.3 Why Are Different Places Similar?

Many features are organized in a regular manner across space. Some regularities are global in scale, whereas others have distinctive local character.

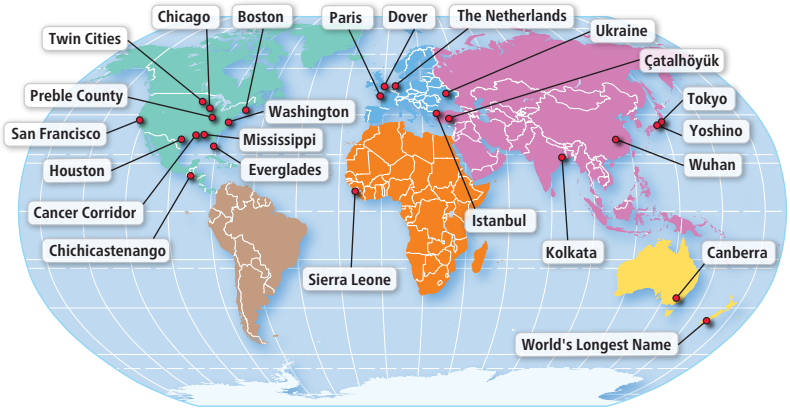
1.4 Why Are Different Places Connected?

Distinctive to geography is the importance given to connections between human activities and the physical environment. Some human activities are sustainable, but others are not.

▶ Students in Athens, Greece, calculate the Earth's circumference.

What do you expect from this geography course? You may think that geography involves memorizing lists of countries and capitals. Perhaps you associate geography with photographic essays of exotic places in popular magazines. Contemporary geography is the scientific study of where people and activities are found across Earth's surface and the reasons they are found there.

LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

1.1 | Why Is Geography a Science?

The word *geography*, invented by the ancient Greek scholar Eratosthenes, is based on two Greek words. *Geo* means "Earth," and *graphy* means "to write." Geography is the scientific study of where people and activities are found across Earth's surface and the reasons why they are found there. Human geographers ask two simple questions: Where are people and activities found on Earth? Why are they found there?

Thinking geographically is one of the oldest human activities. Perhaps the first geographer was a prehistoric human who crossed a river or climbed a hill, observed what was on the other side, returned home to tell about it, and scratched the route in the dirt. The second geographer may have been another prehistoric human who followed that route to reach the other side and venture still farther.

To introduce human geography, we concentrate on two main features of human behavior—culture and economy. The first half of the text explains why the most important cultural features, such as languages, religions, and ethnicities, are arranged as they are across Earth. The second half of the text looks at the distribution of the most important economic activities, including agriculture, manufacturing, and services.

▼ **FIGURE 1-1 WUHAN: PLACE** A street market in 2018, before the start of the COVID-19 pandemic.

▲ **FIGURE 1-2 WUHAN: REGION** The Harbei region, which includes Wuhan, had more cases of COVID-19 per population than China's other regions in 2020, the first full year of the pandemic.

Geography's Basic Concepts

Learning Outcome 1.1.1 Summarize geography's basic concepts.

This chapter introduces basic concepts that geographers employ to address their "where" and "why" questions. Ancient and medieval geographers created maps to describe what they knew about Earth. Today, accurate maps are generated from electronic data.

Geographers employ several basic concepts to explain why everywhere on Earth is in some ways unique and in other ways related to other locations. Many of these concepts are commonly used English words, such as *place* and *region*, but they are given particular meaning by geographers.

Everywhere Is Unique

To explain why everywhere on Earth is unique, geographers have two basic concepts:

- A **place** is a specific point on Earth, distinguished by a particular characteristic. Every place occupies a unique location, or position, on Earth's surface. The city of Wuhan, China, was the place where COVID-19 was first identified, in December 2019, according to the U.S. Centers for Disease Control and Prevention (Figure 1-1).
- A **region** is an area of Earth defined by one or more distinctive characteristics. Geographers divide the world into a number of regions. An example of a region is a province of China, such as Harbei, where Wuhan is located (Figure 1-2).

All Locations Are Interrelated

To explain why different locations are interrelated, geographers rely on three basic concepts:

- **Scale** is the relationship between the portion of Earth being studied and Earth as a whole. Geographers study a variety of scales, ranging from local to global. Many processes that affect humanity's occupation of Earth are global in scale, such as climate change and depletion of energy resources. At the same time, local-scale processes are increasingly important, such as preservation of distinctive cultural and economic activities (Figure 1-3).
- **Space** refers to the physical gap or interval between two objects. Geographers observe that many objects are distributed across space in a regular manner, for discernible reasons (Figure 1-4).
- **Connection** refers to relationships among people and objects across the barrier of space. Geographers study the various means by which connections occur (Figure 1-5).

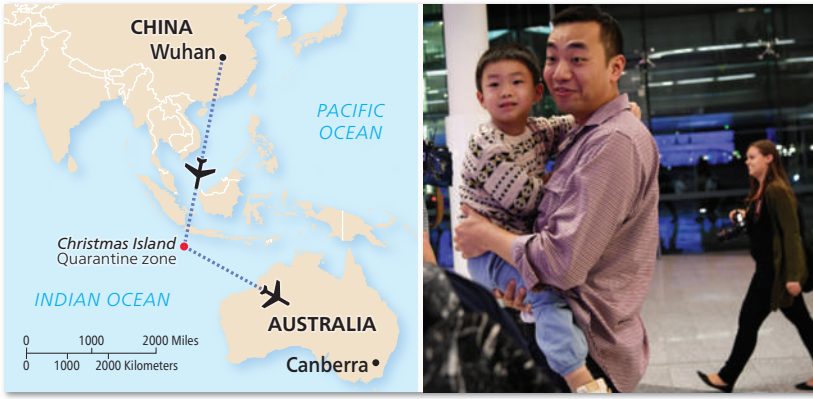
▲ **FIGURE 1-4 WUHAN: SPACE** During the COVID-19 pandemic, a distance of 2 meters (6 feet) from other people was widely recommended as a safe social distance, as these workers eating lunch at a Honda factory in Wuhan demonstrate.

Geography & History

Human geography and history both rely on the collection of evidence about human activity. In his framework of all scientific knowledge, the German philosopher Immanuel Kant (1724–1804) compared geography and history (Figure 1-6).

History and geography differ in one especially important manner: A geographer can drive or fly to another place to study Earth's surface, whereas a historian cannot travel to another time to study other eras firsthand. This ability to reach other places lends excitement to the discipline of geography – and geographic training raises the understanding of other spaces to a level above that of casual sightseeing.

Pause & Reflect 1.1.1 What are the principal connections from your hometown to other places?



(a) (b)

▲ **FIGURE 1-5 WUHAN: CONNECTIONS** (a) In an early attempt to control the spread of COVID-19, Australia quarantined people traveling to the country from Wuhan for 2 weeks in Christmas Island. (b) These Australian citizens returning from Wuhan arrive at Canberra Airport in Australia after their release from quarantine.

▲ **FIGURE 1-3 WUHAN: SCALE** These health-care workers in Wuhan were among the first in the world to receive COVID-19 vaccinations. China's vaccination cards look different than those issued in the United States by the Centers for Disease Control and Prevention.

▼ **FIGURE 1-6 IMMANUEL KANT'S COMPARISON OF GEOGRAPHY AND HISTORY**

Geographers . . .	Historians . . .
identify the location of important places.	identify the dates of important events.
explain why one human activity is found near another.	explain why one human activity follows another chronologically.
ask where and why.	ask when and why.
organize material spatially.	organize material chronologically.
recognize that an action at one point on Earth can result from actions at another point, which can consequently affect conditions elsewhere.	recognize that an action at one point in time can result from past actions and can in turn affect future ones.

Contemporary Geographic Tools

Learning Outcome 1.1.2 Identify geography's principal contemporary mapping tools.

A geographer's most important tool for thinking spatially about the distribution of features across Earth is a map. A **map** is a two-dimensional or flat-scale model of Earth's surface or a portion of it. Geography is immediately distinguished from other disciplines by its reliance on maps to display and analyze information.

A map is a scale model of the real world, made small enough to work with on a desk or computer. It can be a hasty here's-how-to-get-to-the-party sketch, an elaborate work of art, or a precise computer-generated product. For centuries, geographers have worked to perfect the science of mapmaking, called **cartography**. Contemporary cartographers are assisted by computers and satellite imagery.

A map serves two purposes:

- **As a reference tool.** A map helps us find the shortest route between two places and avoid getting lost along the way. We consult maps to learn where in the world something is found, especially in relationship to a place we know, such as a town, body of water, or highway. The maps in an atlas or a road map are especially useful for this purpose.
- **As a communications tool.** A map is often the best means for depicting the distribution of human activities or physical features as well as for thinking about reasons underlying a distribution.

Maps are not just paper documents in textbooks. They have become essential for delivery of contemporary online services through smartphones, tablets, and computers. Location data used in applications and devices are collected through electronic tools. While these digital systems allow geographers to explore more of Earth, they still rely on field work to collect data and ground-truth conclusions. They interview people, conduct surveys, take photographs, and have informal observations of the landscape around them.

GIScience: Analyzing Data

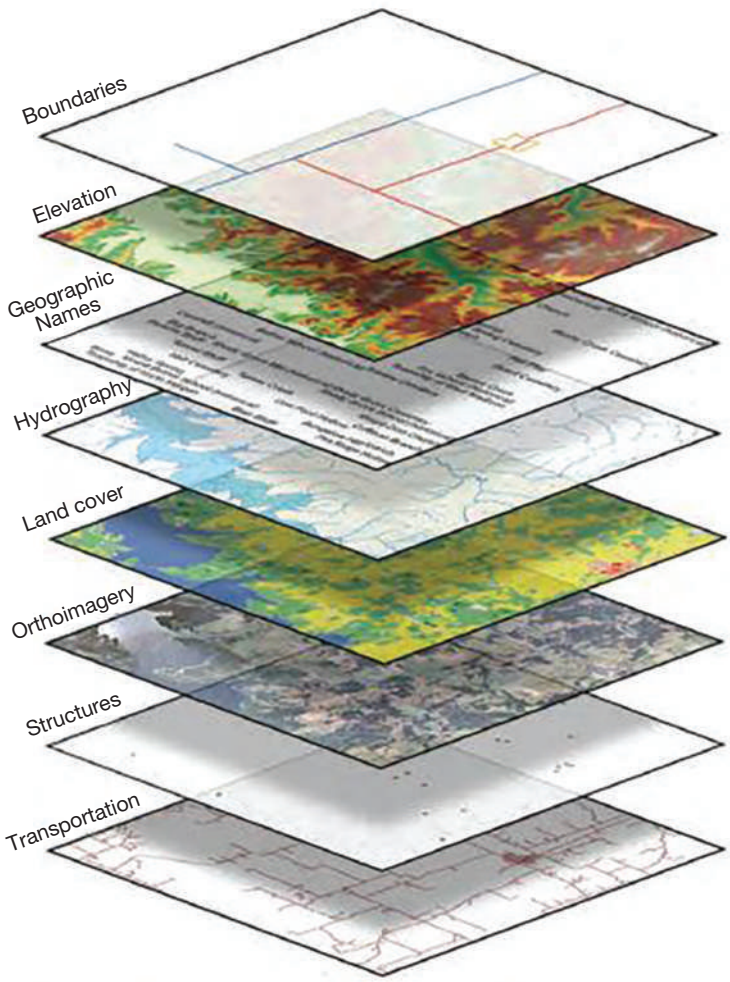
Geographic information science (GIScience) is the analysis of data about Earth acquired through satellite and other electronic information technologies. A **geographic information system (GIS)** captures, stores, queries, and displays the geographic data. GIS produces maps (including those in this text) that are more accurate and attractive than those drawn by hand.

A map is created by retrieving a number of stored objects and combining them to form an image. Each type of information is stored in a layer (Figure 1-7). For example, separate layers could be created for boundaries of countries, bodies of water, roads, and names of places. A simple map might display only a single layer by itself, but most maps combine several layers, and GIS permits construction of much more complex maps than can be drawn by hand.

Some of the data used in GIS come from photos. The science of taking measurements of Earth's surface from photographs is called **photogrammetry**. The acquisition of data about Earth's surface from a satellite orbiting Earth or from other long-distance methods is **remote sensing**. At any moment, an aerial sensor attached to a satellite, airplane, or drone may be recording the image of a tiny area on Earth's surface.

Corporations and government agencies use photogrammetry and remote sensing to create high-quality 3D virtual representations of portions of Earth. These maps can depict the distribution of a wide variety of urban and rural features.

GIScience helps geographers create more accurate and complex maps and measure changes over time in the characteristics of places. Layers of information acquired through remote sensing and produced through GIS can be described and analyzed. GIScience enables geographers to calculate whether relationships between objects on a map are significant or merely coincidental.



▲ **FIGURE 1-7 GIS** Multiple layers may be combined to create maps.

GPS: Pinpointing Locations

Most of the maps fed into our electronic devices are provided by a handful of companies. Our smartphones, tablets, and computers are equipped with **Global Positioning System (GPS)**, which is a system that determines the precise position of something on Earth. The GPS in use in the United States includes two dozen satellites placed in predetermined orbits; a series of tracking stations to monitor and control the satellites; and receivers that compute position, velocity, and time from the satellite signals. GPS is most commonly used for navigation. Pilots of aircraft and ships stay on course with GPS. On land, GPS detects a vehicle's current position, the motorist programs the desired destination into a GPS device, and the device provides instructions on how to reach the destination.

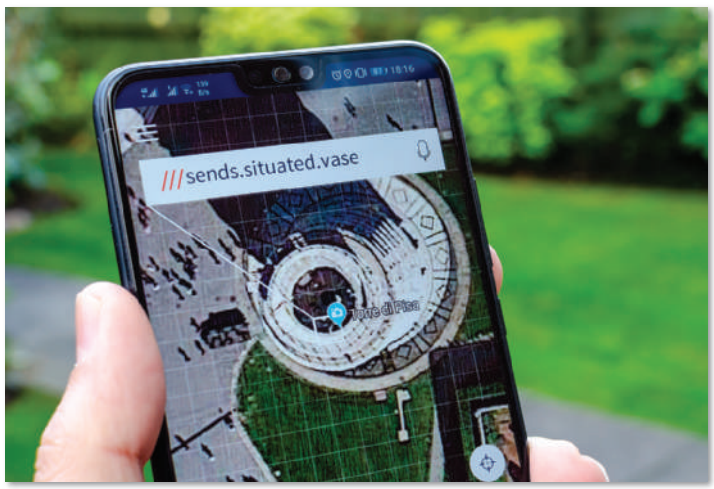
Thanks to GPS, our electronic devices provide us with a wealth of information about the specific place on Earth we currently occupy. The locations of all the information we gather and photos we take with our electronic devices are recorded through **geotagging**, which is identification and storage of a piece of information by its precise latitude and longitude coordinates. Geotagging has led to concerns about privacy.

Geocoding: What3words

What3words is a geocode system that has divided the entire world into 57 trillion squares of 3 meters (10 feet) per side. Each 9-square-meter (100-square-foot) square is identified by three English words. For example, the front door of the White House is identified by ///curve.empty.buzz. This app allows for finding the precise location of many places in the world that do not have traditional street addresses (Figure 1-8).

VGI: Making Maps Yourself

Smartphones, tablets, and computers enable individuals to make maps and share them with others. **Volunteered geographic information (VGI)** is the creation and dissemination of geographic data contributed voluntarily and for free by individuals. VGI is part of the broader trend of **citizen science**, which is scientific research by amateur scientists, and **participatory GIS (PGIS)**, which is community-based mapping. Citizen science and PGIS collect and disseminate local knowledge and information through electronic devices.



▲ **FIGURE 1-8 WHAT3WORDS** Location of Leaning Tower of Pisa.

▲ **FIGURE 1-9 HUMANITARIAN OPENSTREET MAPPING** Assisting responders helping to reach Ebola victims in a rural area of Sierra Leone.

OpenStreetMap is a collaborative project to create a free editable map of the world (Figure 1-9). The geodata underlying the map is considered the primary output of the project. Humanitarian OpenStreetMap Team (HOT) is a global community of volunteers, community leaders, and professionals who work together to create open map data to support sustainable development, such as where to build new housing for the least impact on the environment. They also help with disaster response, such as where to send emergency medical teams during a disease outbreak (Figure 1-10). Cofounder geographer Kate Chapman helped to develop HOT after working in Indonesia to develop maps of flood damage.

A **mashup** is a map that overlays data from one source on top of a map provided by a mapping service, such as Google Maps or Bing Maps. The term comes from the practice of mixing two or more songs. Individuals can create mashups on their personal computers because mapping services provide access to the application programming interface (API), which is the language that links a database such as an address list with software such as a mapping application.

Pause & Reflect 1.1.2 What is an example of a mashup done for your community?

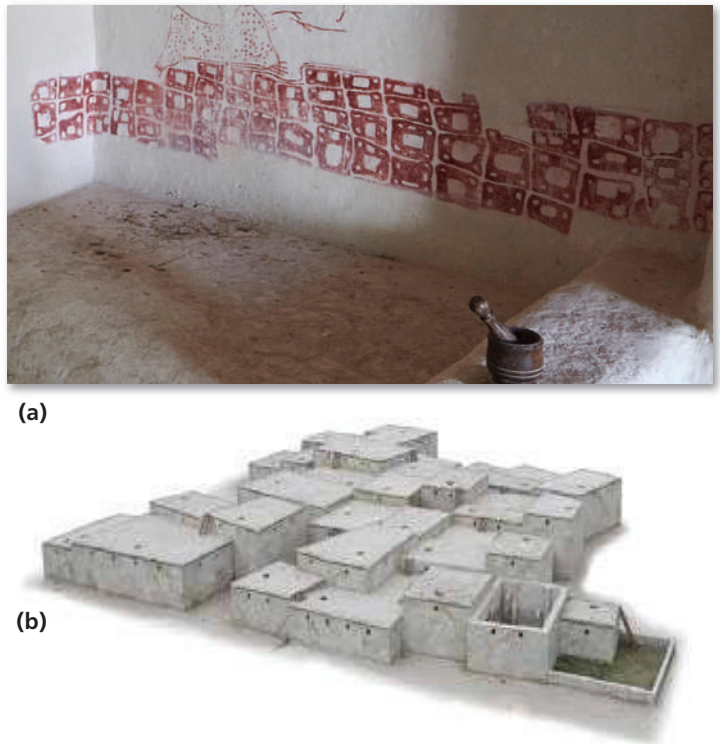
▶ **FIGURE 1-10 OPENSTREETMAP** Miami University geographers help the Red Cross map devastation in Puerto Rico from Hurricane Maria.

Development of the Science of Geography

Learning Outcome 1.1.3 Explain the development of the science of geography.

Perhaps the Earliest Map

The science of geography has prehistoric roots. One of the earliest surviving fully authenticated maps, depicting the town of Çatalhöyük in present-day Türkiye, dates from approximately 6200 B.C.E. Archaeologists found the map on the wall of a house that was excavated during the 1960s (Figure 1-11).



▲ **FIGURE 1-11 AN EARLY MAP** (a) This map, dating from 6200 B.C.E., depicts the town of Çatalhöyük, in present-day Türkiye, and the eruption of the Hasan Dağ| (Mount Hasan) twin-peaks volcano, which is actually located around 140 kilometers (87 miles) northeast of the town. Archaeological evidence indicates that the volcano did erupt around the time that the map was made. The map is now in the Konya Archaeology Museum. (b) Artist's impression of Çatalhöyük, created from details on the map.

Geography in the Ancient World

Major contributors to geographic thought in the ancient eastern Mediterranean included:

- Thales of Miletus (ca. 624–ca. 545 B.C.E.), who applied principles of geometry to measuring land area.
- Anaximander (610–ca. 546 B.C.E.), a student of Thales, who made a world map based on information from sailors and argued that the world was shaped like a cylinder.
- Pythagoras (ca. 570–ca. 495 B.C.E.), who may have been the first to propose a spherical world, arguing that the sphere was the most perfect form.
- Hecataeus (ca. 550–ca. 476 B.C.E.), who may have produced the first geography book, called *Periodos Ges* ("Journey Around the Earth").
- Aristotle (384–322 B.C.E.), who was the first to demonstrate that Earth was spherical on the basis of evidence.
- Eratosthenes (ca. 276–ca. 194 B.C.E.), the inventor of the word "geography," who accepted that Earth was round (as few others did in his day), calculated its circumference within 0.5 percent accuracy, divided Earth into five climatic regions, and described the known world in one of the first geography books.
- Strabo (ca. 64 B.C.E.–ca. 24 C.E.), who described the known world in a 17-volume work titled *Geographica* ("Geography").
- Ptolemy (ca. 100–ca. 170 C.E.), who wrote an eight-volume *Geographia*, codified basic principles of mapmaking, and prepared numerous maps that were not improved upon for more than 1,000 years (Figure 1-12).

▲ **FIGURE 1-12 WORLD MAP BY PTOLEMY, CA.150 C.E.** The map shows the known world at the height of the Roman Empire, around the Mediterranean Sea and Indian Ocean.

Early Asian & African Geographers

After Ptolemy, little progress in geographic thought was made in Europe for more than 1,000 years. Maps became less mathematical and more fanciful, showing Earth as a flat disk surrounded by fierce animals and monsters. Geographic inquiry continued, though, elsewhere in the world. Ancient and medieval contributors outside Europe included:

- "Yu Gong" ("Tribute of Yu"), written by an unknown author in the fifth century B.C.E., described the economic resources of China's different provinces; it was a chapter in a book called *Shujing* ("Book of Documents"), considered one of five classics of ancient Chinese literature.
- Pei Xiu (224–271 C.E.), the "father of Chinese cartography," who produced an elaborate map of the country in 267 C.E.
- Muhammad al-Idrisi (1100–1165), an Arab geographer whose extensive travels through Southwest Asia & North Africa informed his creation of a world map and geography text in 1154, building on Ptolemy's long-neglected work (Figure 1-13).
- Ibn Battuta (1304–ca. 1368), a Moroccan scholar who wrote *Rihla* ("Travels") based on three decades of journeys covering more than 120,000 kilometers (75,000 miles) through northern Africa, southern Europe, and much of Asia (Figure 1-14).

▲ **FIGURE 1-13 WORLD MAP BY AL-IDRISI, 1154** Al-Idrisi built on Ptolemy's map, which had been neglected for nearly a millennium.

▲ **FIGURE 1-14 IBN BATTUTA** Ibn Battuta on horseback in front of a map of his journeys, illustrated by twentieth-century Polish artist Hanna Balicka-Fribes.

Geography's Revival in Europe

Geography revived in Europe during the Age of Exploration and Discovery. Columbus, Magellan, and other explorers who sailed across the oceans in search of trade routes and resources in the fifteenth and sixteenth centuries required accurate maps to reach desired destinations without wrecking their ships. In turn, cartographers took information collected by the explorers to create more accurate maps. Influential European cartographers included:

- Martin Waldseemüller (ca. 1470–1520), a German cartographer who was credited with producing the first map to use the label "America"; he wrote on the map (translated from Latin) "from Amerigo the discoverer . . . as if it were the land of Americus, thus America" (Figure 1-15).
- Abraham Ortelius (1527–1598), a Flemish cartographer, who created the first modern atlas and was the first to hypothesize that the continents were once joined together before drifting apart.
- Bernhardus Varenius (1622–1650), who produced *Geographia Generalis*, which stood for more than a century as the standard treatise on systematic geography.

Pause & Reflect 1.1.3 What is one main difference between the world maps of Ptolemy (Figure 1-12) and of Waldseemüller (Figure 1-15)?

▲ **FIGURE 1-15 WORLD MAP BY WALDSEEMÜLLER, 1508**

Interpreting Maps

Learning Outcome 1.1.4 Explain how the geographic grid locates points on Earth's surface and helps to tell time.

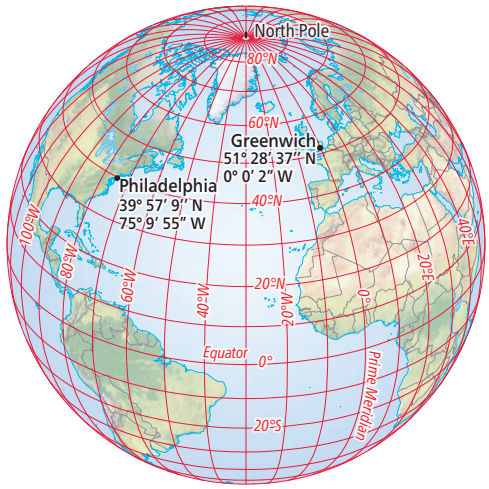
Geographers can create a wide variety of maps. The most suitable variety of map depends on the type of data to be displayed.

The Geographic Grid

The geographic grid is a system of imaginary arcs drawn in a grid pattern on Earth's surface. The location of any place on Earth's surface can be described precisely by meridians and parallels, two sets of imaginary arcs drawn in a grid pattern on Earth's surface:

- A **meridian** is an arc connecting the North and South poles. The location of each meridian is identified on Earth's surface according to a numbering system known as **longitude**. Longitude is the basis for telling time.
- A **parallel** is a circle drawn around the globe parallel to the equator and at right angles to the meridians. The numbering system to indicate the location of a parallel is called **latitude**.

Because Earth is roughly spherical, distances on the geographic grid are expressed in degrees of longitude and latitude based on the 360 degrees in a circle (Figure 1-16).



▲ **FIGURE 1-16 THE GEOGRAPHIC GRID**

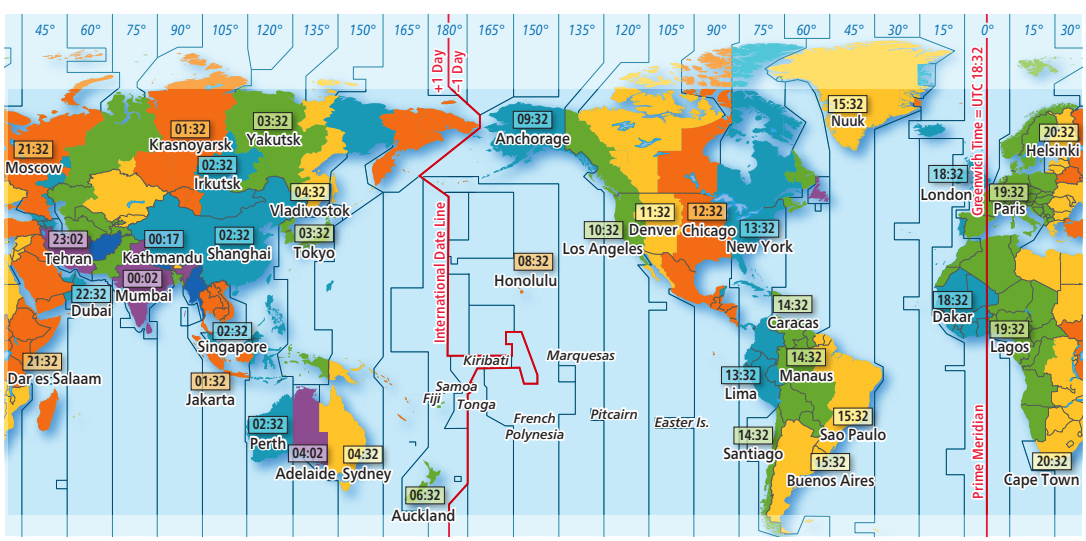
Telling Time

Longitude is the basis for calculating time (Figure 1-17). Earth as a sphere is divided into 360° of longitude (the degrees from 0° to 180° west longitude plus the degrees from 0° to 180° east longitude).

As Earth rotates daily, these 360 imaginary arcs of longitude pass beneath the cascading sunshine. If we let every fifteenth degree of longitude represent one time zone, and divide the 360° by 15°, we get 24 time zones, or one for each hour of the day. By international agreement, **Coordinated Universal Time (UTC)**, known informally as Greenwich Mean Time (GMT), which is the time at the **prime meridian** (0° longitude), is the master reference time for all points on Earth.

Each 15° band of longitude is assigned to a standard time zone. The western United States, which is near 120° west longitude, is therefore 8 hours earlier than UTC. (The 120° difference between the prime meridian and 120° west longitude, divided by 15° per hour, equals 8 hours.) The **International Date Line** for the most part follows 180° longitude. When the International Date Line is crossed heading east (toward America), the clock moves back 24 hours, or one entire day. When it is crossed heading west (toward Asia), the calendar moves ahead one day.

Pause & Reflect 1.1.4 Use an online search tool to find the longitude and latitude of your community.



◀ **FIGURE 1-17 TIME ZONES**

Types of Maps

Maps can represent the distribution of data for one or more variables in a variety of ways. Figures 1-18 through 1-22 show five ways to display the distribution of data gathered on the COVID-19 pandemic in the United States.

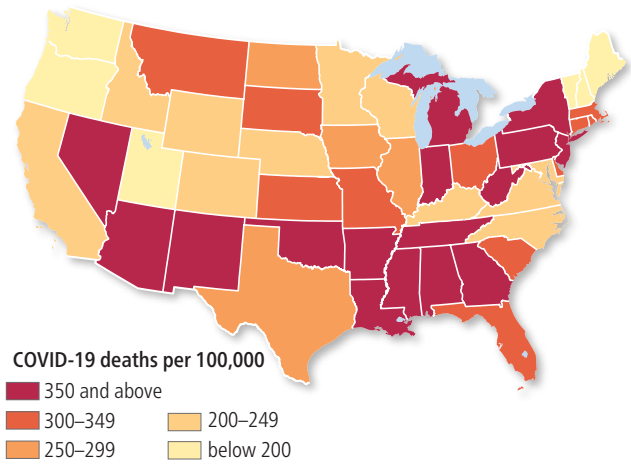
Choropleth Map. A **choropleth map** is a map where recognizable areas are shaded or patterned in proportion to the data collected. For example, areas with darker colors may represent the highest range of the data (Figure 1-18).

Graduated Symbol Map. A **graduated symbol map** displays a graphic, such as a circle, multiple times that changes in size according to the value of data. A higher value is typically represented by a larger-sized graphic (Figure 1-19).

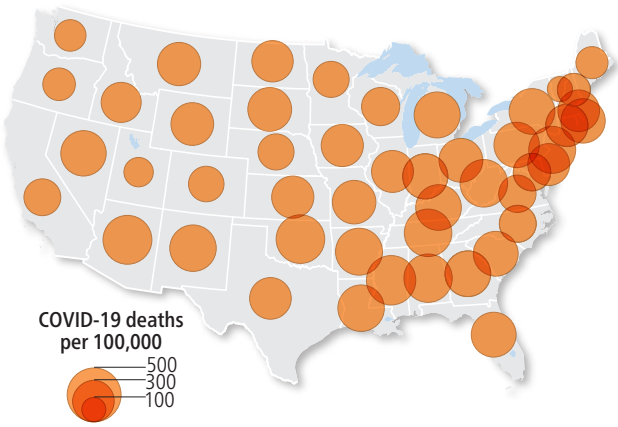
Isoline Map. An **isoline map** connects with lines all the places that have particular values (Figure 1-20).

Dot Distribution Map. A **dot distribution map** depicts data as points and shows how those points are clustered together or spread out over an area. Each dot represents a predetermined number of observations, which could be one or many (Figure 1-21).

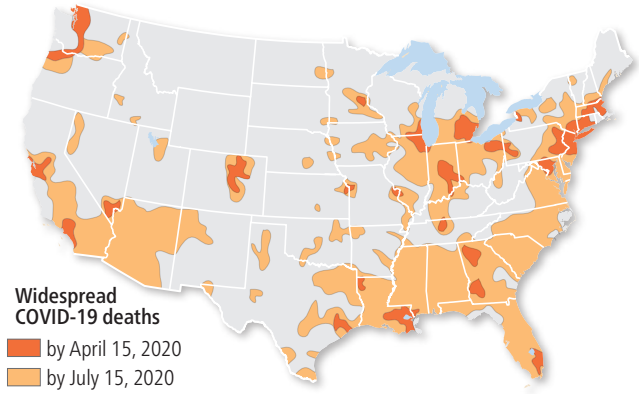
Cartogram. A **cartogram** is a map in which the size of a territory, such as a U.S. state, is proportional to the value of particular data (Figure 1-22).



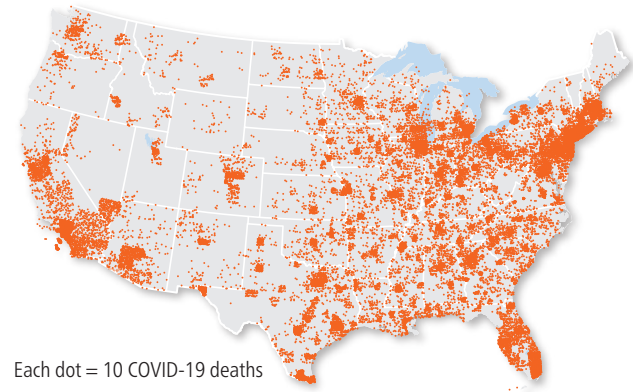
▲ **FIGURE 1-18 CHOROPLETH MAP** The darker the state, the more deaths attributed to COVID-19 per capita, January 2020 through July 2022.



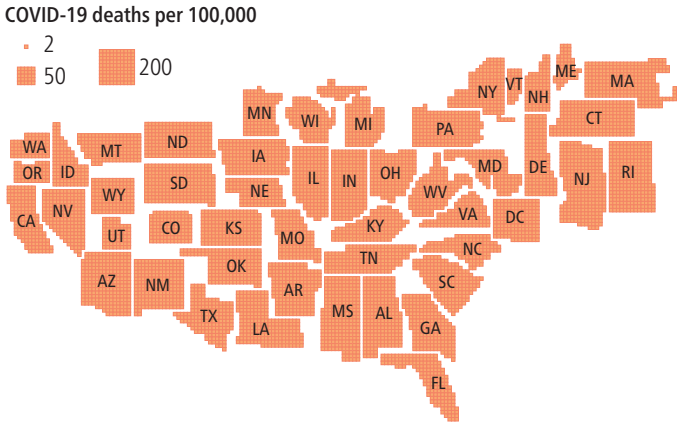
▲ **FIGURE 1-19 GRADUATED SYMBOL MAP** The larger the circle, the more deaths attributed to COVID-19 per capita, January 2020 through July 2022.



▲ **FIGURE 1-20 ISOLINE MAP** The regions in the darker colors experienced COVID-19 deaths earlier than did the regions in the lighter colors.



▲ **FIGURE 1-21 DOT DISTRIBUTION MAP** More dots in a region mean more deaths there attributed to COVID-19, January 2020 through July 2022.



▲ **FIGURE 1-22 CARTOGRAM MAP** The larger the area of the state, the more deaths attributed to COVID-19 per capita, January 2020 through July 2022.

Making Maps

Learning Outcome 1.1.5 Explain the role of map scale and projection in reading maps.

To make any map, a cartographer must make two decisions:

- How much of Earth's surface to depict on the map (map scale).
- How to transfer a spherical Earth to a flat map (projection).

Map Scale

What is the purpose of the map? Is it necessary to show the entire globe on a map, or just one continent, or a country, or a city? To make a scale model of the entire world, many details must be omitted because there simply is not enough space. Conversely, if a map shows only a small portion of Earth's surface, such as a street map of a city, it can provide a wealth of detail about a particular place.

The level of detail and the amount of area covered on a map depend on its **map scale**. When specifically applied to a map, map scale refers to the relationship of a feature's size on a map to its actual size on Earth.

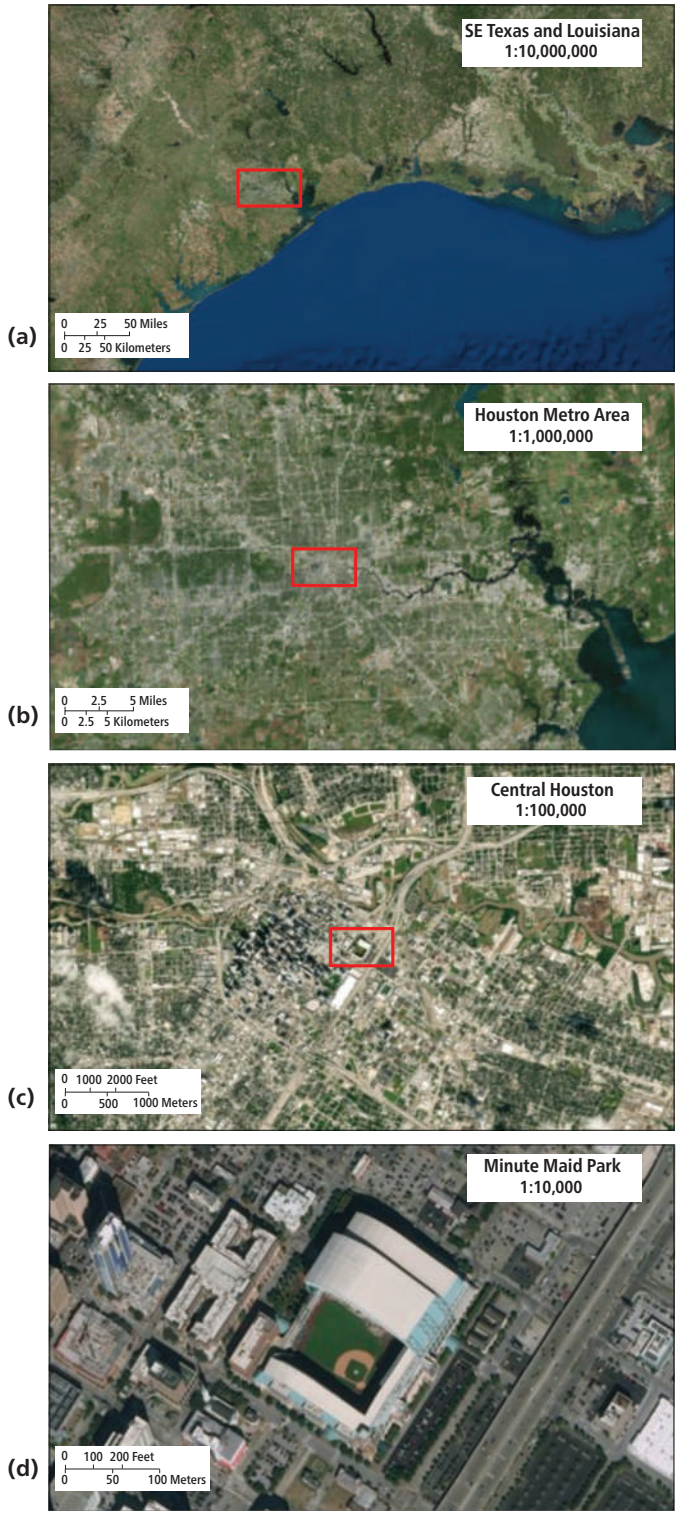
Map scale is presented in three ways. Maps often display scale in more than one of these three ways:

- **Ratio.** A ratio or fraction shows the numerical relationship between distances on the map and Earth's surface. A scale of 1:1,000,000 means that 1 unit (for example, inch, centimeter, foot, finger length) on the map represents 1 million of the same unit on the ground. The 1 on the left side of the ratio always refers to a unit of distance on the map, and the number on the right always refers to the same unit of distance on Earth's surface.
- **Written.** A written scale describes the relationship between map and Earth distances in words. For example, in the statement "1 centimeter equals 10 kilometers," the first number refers to map distance and the second to distance on Earth's surface.
- **Graphic.** A graphic scale usually consists of a bar line marked to show distance on Earth's surface. To use a bar line, first determine with a ruler the distance on the map in inches or centimeters. Then hold the ruler against the bar line and read the number on the bar line opposite the map distance on the ruler. The number on the bar line is the equivalent distance on Earth's surface.

Larger & Smaller Scales

The appropriate scale for a map depends on the information being portrayed. A map of a downtown area, such as Figure 1-23(d), may have a scale of 1:10,000, whereas a map of southeast Texas, such as Figure 1-23(a), may have a scale of 1:10,000,000. One inch represents about 800 feet on the Minute Maid Park map and about 158 miles on the southeast Texas map.

At the scale of a small portion of Earth's surface, a map can provide detailed information about an area such as a city's downtown. At the scale of the entire globe, the amount of detail must be greatly reduced, but the map can still effectively communicate processes and trends that affect everyone.



▲ **FIGURE 1-23 MAP SCALE** The four images show an area centered on Houston, Texas, at progressively larger scales: (a) southeast Texas, (b) the city of Houston, (c) central Houston, and (d) Minute Maid Park. Each map includes ratio and graphic scales.

Projection

Earth is very nearly a sphere and is therefore accurately represented with a globe. However, a globe is an extremely limited tool with which to communicate information about Earth's surface. A small globe does not have enough space to display detailed information, whereas a large globe is too bulky and cumbersome to use. And a globe is difficult to write on, photocopy, display on a computer screen, or carry in a car. Consequently, most maps – including those in this text – are flat. Three-dimensional maps can be made but are expensive and difficult to reproduce.

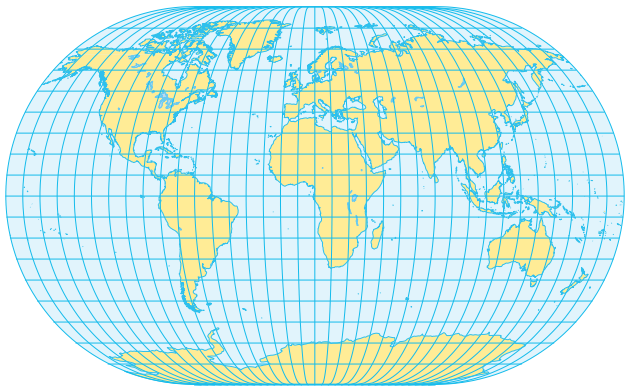
Earth's spherical shape poses a challenge for cartographers because drawing Earth on a flat piece of paper unavoidably produces some distortion. Cartographers have invented hundreds of clever methods of producing flat maps, but none has produced perfect results. The scientific method of transferring locations on Earth's surface to a flat map is called **projection**.

The problem of distortion is especially severe for maps depicting the entire world. Four types of distortion can result:

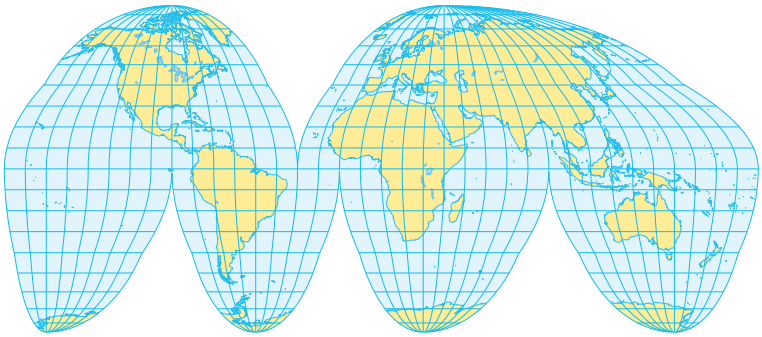
1. The ***shape*** of an area appears more elongated or squat than in reality.
2. The ***distance*** between two points may become increased or decreased.
3. The ***relative size*** of different areas may be altered, so that one area may appear larger than another area on a map even though in reality the reverse is true.
4. The ***direction*** from one place to another can be distorted.

Most of the world maps in this text use the Winkel equal area projection (Figure 1-24). Other common world projections are Mercator (Figure 1-25), Goode Homolosine (Figure 1-26), and Gall-Peters (Figure 1-27).

Pause & Reflect 1.1.5 Compare the sizes of Greenland and South America in Figures 1-24, 1-25, 1-26, and 1-27. Which of the two landmasses is actually larger? How do you know?

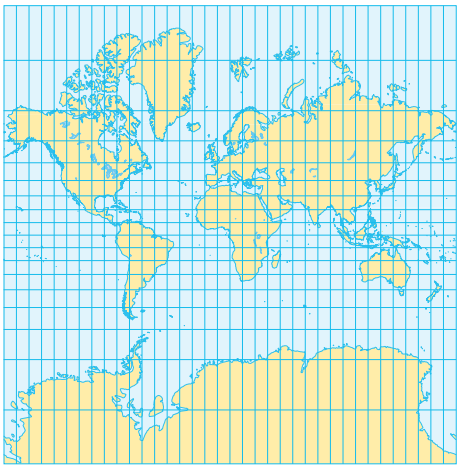


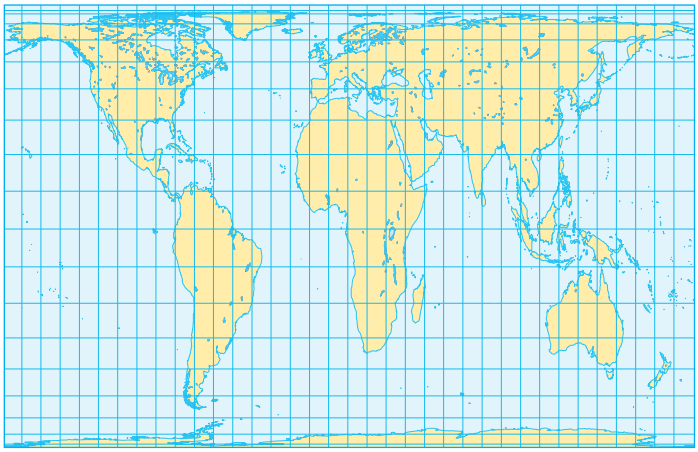
▲ **FIGURE 1-24 WINKEL PROJECTION** The relative sizes of the landmasses on the map are the same as in reality. The projection minimizes distortion in the shapes of most landmasses. Areas toward the North and South poles, such as Greenland and Antarctica, become more distorted, but they are sparsely inhabited, so distorting their shapes usually is inconsequential. However, by allocating space to the oceans, the land areas are much smaller than on interrupted maps of the same size.



▲ **FIGURE 1-26 GOODE HOMOLOSINE PROJECTION** This projection separates the Eastern and Western hemispheres into two pieces, a feature known as interruption. It gives more prominence to the landmasses. The meridians (the vertical lines), form right angles with the parallels (the horizontal lines) on a globe, but not in this projection.

▶ **FIGURE 1-25 MERCATOR PROJECTION** Shape is distorted very little, direction is consistent, and the map is rectangular. However, relative size is grossly distorted toward the poles, making high-latitude places such as Antarctica look much larger than they actually are.





▲ **FIGURE 1-27 GALL-PETERS PROJECTION** This projection does not distort relative size but does distort shape.

KEY ISSUE

1.2 | Why Is Every Place Unique?

Place was defined at the beginning of the chapter as a specific point on Earth distinguished by a particular characteristic. Every place occupies a unique location, or position, on Earth's surface. Although each place on Earth is in some respects unique, in other respects it is similar to other places. The interplay between the uniqueness of each place and the similarities among places lies at the heart of geographic inquiry into why things are found where they are.

Place: A Unique Location

Learning Outcome 1.2.1 Identify the distinctive features of a place.

Humans possess a strong sense of place – that is, a feeling for the features that contribute to the distinctiveness of a particular spot on Earth – perhaps a hometown, vacation destination, or part of a country. Geographer Anne Buttimer identified a sense of intimacy between people and place. Describing the features of a place is an essential building block for geographers to explain similarities, differences, and changes across Earth. Geographers think about where particular places are located and the combination of features that make each place on Earth distinct.

Geographers describe a feature's place on Earth by identifying its **location**, the position that something occupies on Earth's surface. In doing so, they consider three ways to identify location: place name, site, and situation.

Place Names

Because all inhabited places on Earth's surface – and many uninhabited places – have been named, the most straightforward way to describe a particular location is often by referring to its place name. A **toponym** is the name given to a place on Earth.

A place may be named for a person, perhaps its founder, such as Lord Baltimore, or a famous person with no connection to the community, such as George Washington. Some settlers select place names associated with religion, such as St. Louis and St. Paul, whereas other names derive from ancient history, such as Athens, Attica, and Rome, or from earlier occupants of the place, such as Milwaukee and Pontiac.

A place name may also indicate the origin of its settlers (Figure 1-28). Place names commonly have British origins in North America and Australia, Portuguese origins in Brazil, Spanish origins elsewhere in Latin America, and Dutch origins in South Africa. Some place names derive from features of the physical environment. Trees, valleys, bodies of water, and other natural features appear in the place names of most languages.

The U.S. Board on Geographical Names, operated by the U.S. Geological Survey, was established in the late nineteenth century to be the final arbiter of names on U.S. maps. In recent years the board has been especially concerned with removing offensive place names, such as those named for persons who condoned racial oppression or committed crimes.

Pause & Reflect 1.2.1 What is the origin of the toponym of your hometown?

▲ **FIGURE 1-28 WORLD'S LONGEST PLACE NAME** This place in New Zealand is recognized as the world's longest one-word place name. It translates from the Maori language as "The summit where Tamatea, the man with the big knees, who slid, climbed, and swallowed mountains, known as the land-eater, played his flute to his loved one."

Site

The second way that geographers describe the location of a place is by **site**, which is the physical character of a place. Important site characteristics include climate, water sources, topography, soil, vegetation, latitude, and elevation. The combination of physical features gives each place a distinctive character.

Site factors have always been essential in selecting locations for settlements, although people have disagreed on the attributes of a good site, depending on cultural values. Some have preferred a hilltop site for easy defense from attack. Others have located settlements near convenient river-crossing points to facilitate communication with people in other places.

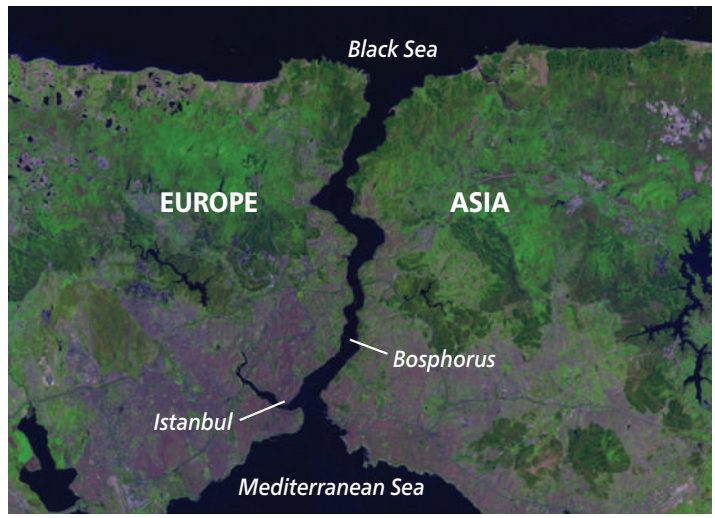
Humans have the ability to modify the characteristics of a site. Central Boston is more than twice as large today as it was during colonial times (Figure 1-29). Colonial Boston was a peninsula connected to the mainland by a very narrow neck. During the nineteenth century, a dozen major projects filled in most of the bays, coves, and marshes. A major twentieth-century landfill project created Logan Airport. Several landfill projects continue into the twenty-first century. The central areas of New York and Tokyo have also been expanded through centuries of landfilling in nearby bodies of water, substantially changing these sites.

▲ **FIGURE 1-29 CHANGING SITE OF BOSTON** The site of Boston has been altered by filling in much of Boston Harbor.

Situation

Situation, also known as **relative location**, is the location of a place relative to other places. **Absolute location** describes the position of a place in a way that never changes, such as geographic coordinates of latitude and longitude. Situation is a valuable way to indicate location, for two reasons:

- **Finding an unfamiliar place.** Situation helps us find an unfamiliar place by comparing its location with a familiar one. We give directions to people by referring to the situation of a place: "It's down past the courthouse, on Locust Street, after the third traffic light, beside the yellow-brick bank." We identify important buildings, streets, and other landmarks to direct people to the desired location.
- **Understanding the importance of a place.** Many locations are important because they are accessible to other places. For example, because of its situation, Istanbul has become a center for the trading and distribution of goods between Europe and Asia (Figure 1-30). Istanbul is situated along the Bosphorus, which connects the Mediterranean Sea and the Black Sea (Figure 1-31). Istanbul is an especially important route for ships traveling between Europe and Asia.



▲ **FIGURE 1-30 SITUATION OF ISTANBUL: SATELLITE IMAGE** This satellite image shows Istanbul is situated along the Bosphorus, a waterway between the Black and Mediterranean seas. Europe lies to the west and Asia to the east.

▶ **FIGURE 1-31 SITUATION OF ISTANBUL: DOWNTOWN** Most of the image depicts the Europe portion of Istanbul. The Asia portion is in the background.

Region: A Unique Area

Learning Outcome 1.2.2 Identify the three types of regions.

The "sense of place" that humans possess may apply to a larger area of Earth rather than to a specific point. Region was defined at the beginning of the chapter as an area of Earth distinguished by one or more distinctive characteristics. People, activities, and environment display similarities and regularities within a region and differ in some ways from those of other regions. A region gains uniqueness from possessing not a single human or environmental feature but a combination of them.

A particular place can be included in more than one region, depending on how the region is defined. The designation "region" can be applied to any area larger than a point and smaller than the entire planet. Geographers most often apply the concept at one of two scales:

- Several neighboring countries that share important features, such as those in Latin America.
- Many localities within a country, such as those in southern California.

Cultural Landscape

A region derives its unified character through the **cultural landscape** – a combination of cultural features such as language and religion, economic features such as agriculture and industry, and physical features such as climate and vegetation. The southern California region can be distinguished from the northern California region, for example.

The contemporary cultural landscape approach in geography – sometimes called the regional studies approach – was initiated in France by Paul Vidal de la Blache (1845–1918) and Jean Brunhes (1869–1930). It was later adopted by several American geographers, including Carl Sauer (1889–1975) and Robert Platt (1891–1964). Sauer defined cultural landscape as an area fashioned from nature by a cultural group. "Culture is the agent, the natural area is the medium, the cultural landscape is the result."

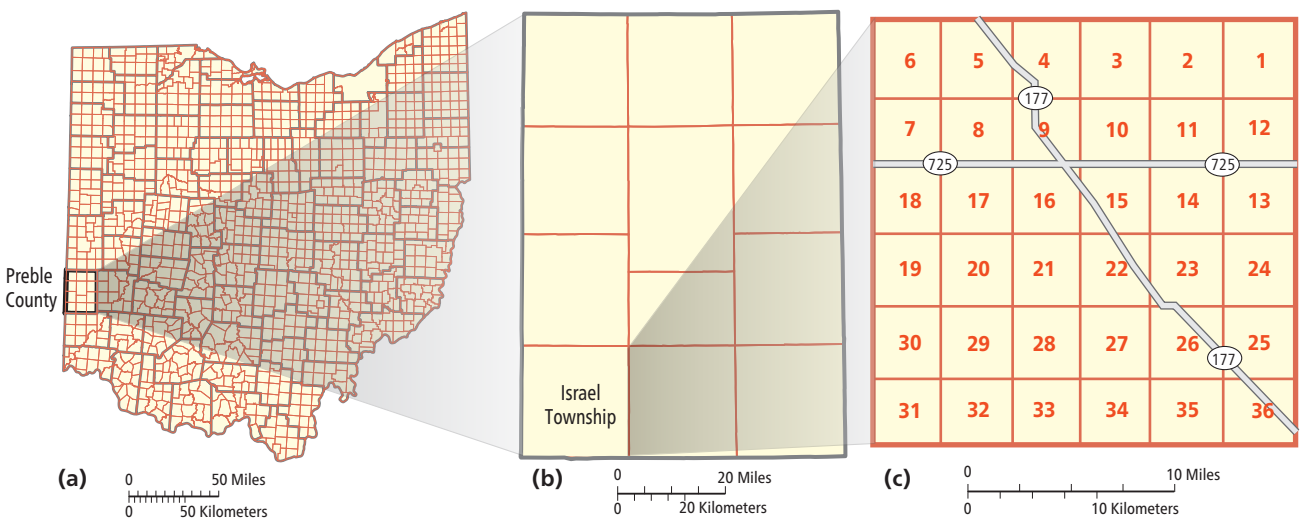
Formal Region

Geographers identify three types of regions – formal, functional, and vernacular. A **formal region**, also called a **uniform region**, is an area within which everyone shares in common one or more distinctive characteristics. The shared feature used to define the region could be a cultural value such as a common language, an economic activity such as production of a particular crop, or an environmental property such as climate. In a formal region, the selected characteristic is present throughout.

Some formal regions are easy to identify, such as countries or local government units. Ohio is an example of a formal region, characterized with equal intensity throughout the state by a government that passes laws, collects taxes, and issues license plates. The formal region of Ohio has clearly drawn and legally recognized boundaries, and everyone living within them shares the status of being subject to a common set of laws.

Formal regions smaller than states can be found across the United States. For example, the U.S. Land Ordinance of 1785 divided much of the country into townships, 6 miles on each side. A township, in turn, was divided into 36 sections, 1 mile on each side (Figure 1-32).

In identifying a formal region, it is important to recognize the diversity of cultural, economic, and environmental factors, even while making a generalization. A minority of people in a region may speak a language, practice a religion, or possess resources different from those of the majority. Although a region may be described by certain positions its inhabitants hold in society based on their gender or ethnicity, individuals within that region may not all conform to that description.



▲ **FIGURE 1-32 FORMAL REGION** The State of Ohio; (b) Preble County; (c) Israel Township.

Functional Region

A **functional region**, also called a **nodal region**, is an area organized around a node or focal point. The characteristic chosen to define a functional region dominates at a central focus or node and diminishes in importance outward. The region is tied to the central point by transportation or communications systems or by economic or functional associations.

Geographers often use functional regions to convey information about economic areas. A region's node may be a shop or service, with the boundaries of the region marking the limits of the trading area of the activity. People and activities may be attracted to the node, and information may flow from the node to the surrounding area.

An example of a functional region is the reception area of a TV station. At the center of its service area, a TV station's over-the-air signal is strongest, and the percentage of cable and satellite dish receivers tuned to that station is highest. At some distance from the center, more people are watching a station originating in another city. That place is the boundary between the nodal regions of the two TV market areas (Figure 1-33).

Social media offer numerous examples of functional regions. Although social media can be used to interact equally with someone nearby and someone far away, in reality we interact more with people nearby and less with people far away. Nonetheless, new technology can break down some traditional functional regions. Through the internet, customers can shop at distant stores, and newspapers composed in one place are delivered to customers elsewhere.

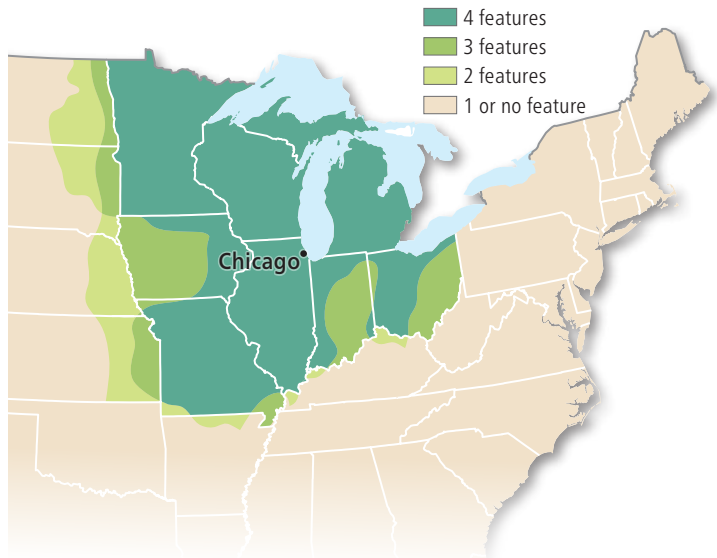
Vernacular Region

A **vernacular region,** or **perceptual region**, is an area that people believe exists as part of their cultural identity. Such regions emerge from people's informal sense of place rather than from scientific models developed through geographic thought.

As an example of a vernacular region, Americans frequently refer to the Midwest as a place with environmental and cultural features perceived to be distinct from those of the rest of the United States (Figure 1-34). However, the actual location of the Midwest depends on the feature being mapped (Figure 1-35). A useful way to identify a vernacular region is to get a description of the region from the people living in it and to draw a **mental map**, which is based on what an individual relates about the place that contains personal impressions of what is in the place and where the place is located.

Pause & Reflect 1.2.2 What environmental and cultural features might help define the region of New England?

▲ **FIGURE 1-33 FUNCTIONAL REGION: FLORIDA TV MARKETS** (a) Designated market areas (DMAs) within Florida are examples of functional regions. The state of Florida is an example of a formal region. (b) The Miami ABC affiliate.



▲ **FIGURE 1-34 VERNACULAR REGION: DEFINING THE MIDWEST** The Midwest is a vernacular region that can be defined in a number of ways:

- U.S. Census definition
- At least 50% self-identify as a Midwesterner
- Eastern broadleaf forest or prairie parkland ecosystem
- At least 60% "like" a team in the MLB A.L. or N.L. Central Division

▼ **FIGURE 1-35 VERNACULAR REGION: PICTURING THE MIDWEST** A feature of the Midwest vernacular region is a large number of fans of the Chicago Cubs, who play homes games at Wrigley Field.

Regions: Geography & Culture

Learning Outcome 1.2.3 Explain geographic elements in defining culture.

Geographers refer to **culture**, which is the body of material possessions, customary beliefs, and social norms that together constitutes the distinct tradition of a group of people. Geographers distinguish groups of people according to important cultural characteristics, describe where particular cultural groups are distributed, and offer reasons to explain the observed distribution. The distribution of cultural groups and the ways different cultures are expressed in the landscape gives rise to distinctive regions.

In everyday language, we think of culture as the collection of novels, paintings, symphonies, and other works produced by talented individuals. A person with a taste for these intellectual outputs is said to be "cultured." Intellectual culture is often distinguished from popular culture, such as TV. Culture also refers to small living organisms, such as those found under a microscope or in yogurt. *Agriculture* is a term for the growing of living material at a much larger scale than in a test tube.

The origin of the word *culture* is the Latin *cultus*, which means "to care for." Culture is a complex concept because "to care for" something has two very different meanings:

- To care about – to adore or worship something, as in the modern word *cult*.
- To take care of – to nurse or look after something, as in the modern word *cultivate*.

Geography looks at both of these meanings of the concept of culture to see why each region in the world is unique.

Geography & Culture: What People Care About

Geographers study why the customary ideas, beliefs, and values of a people produce a distinctive culture in a particular place. Especially important cultural values derive from a group's language, religion, and ethnicity. These three cultural traits are an excellent way of identifying the location of a culture as well as the principal means by which cultural values become distributed around the world.

Language is a system of signs, sounds, gestures, and marks that have meanings understood within a cultural group. People communicate the cultural values they care about through language, and the words themselves tell something about where different cultural groups are located. The distribution of speakers of different languages and reasons for the distinctive distribution are discussed in Chapter 5.

Religion is an important cultural value because it is the principal system of attitudes, beliefs, and practices through which people worship in a formal, organized way. As discussed in Chapter 6, geographers look at the distribution of religious groups around the world and the different ways that the various groups interact with their environment.

Ethnicity is identity with a group of people who share the cultural traditions of a particular homeland or hearth. As addressed in Chapter 7, geographers find that problems of conflict and inequality tend to occur in places where more than one ethnic group inhabits and seeks to organize the same territory.

Geography & Culture: What People Take Care Of

The second element of culture of interest to geographers is production of material wealth – the food, clothing, and shelter that human need in order to survive and thrive. All people consume food, wear clothing (Figure 1-36), build shelter, and create art, but different cultural groups obtain their wealth in different ways.

Geographers divide the world into regions of developed countries and regions of developing countries. Various shared characteristics – such as per capita income, level of education, and life expectancy – distinguish developed regions and developing regions. These differences are reviewed in Chapter 9. Possession of wealth and material goods is higher in developed countries than in developing countries because of the different types of economic activities carried out in the two types of countries. People in developing countries are more likely to work in agriculture, whereas people in developed countries are more likely to earn their living through performing services in exchange for wages. This fundamental economic difference between developed and developing regions is discussed in more detail in Chapters 10 through 13.

Pause & Reflect 1.2.3 Describe differences that you see in the clothing in Figures 1-36a and b.

(a) (b)

FIGURE 1-36 CLOTHING IN DIFFERENT REGIONS OF GUATEMALA (a) In rural areas and small towns, the color and pattern of the clothes often identify the specific cultural group and place of residence of the wearer, such as Mayan women in the small town of Chichicastenango in western Guatemala. (b) In Guatemala City, the country's capital and largest city, women wear clothing more typical of urban residents in other countries; these women are enrolled in an entrepreneurship course held in a shopping mall in Guatemala City.

Local Diversity

Globalization has not destroyed the uniqueness of local culture and economy. Human geographers understand that many contemporary social problems result from a tension between forces promoting global culture and global economy on the one hand and preservation of local economic autonomy and local cultural traditions on the other hand. Strong adverse reaction to globalization by many people in both developed and developing countries has inspired efforts to restore local cultural traditions and sever economic relations with other places. Lawmakers in countries and regions within countries disagree sharply on the appropriate policies to improve economic conditions.

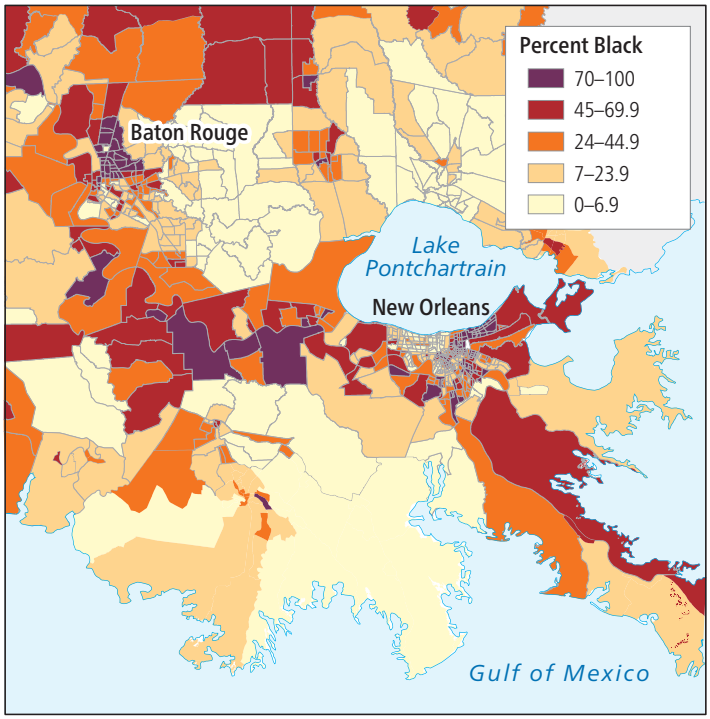
Cultural differences within regions not only persist but actually flourish in many cases. The communications revolution that promotes globalization of culture also permits preservation of cultural diversity. TV, for example, was once limited to a handful of channels displaying one set of cultural values. With the distribution of programming through cable, satellite, the internet, and streaming services, people now can choose from an infinite number of programs in many languages. With the globalization of communications, people in two distant places can watch the same TV program. At the same time, with the fragmentation of the broadcasting market, two people in the same house can watch different programs (Figure 1-37). Groups of people on every continent may aspire to wear jeans, but unique clothing is still worn in regions of the world. In a global culture, companies can target groups of consumers with similar tastes in different parts of the world.

Geographers take a range of approaches to understanding the uniqueness of local culture and economy. **Post-structuralist geography** examines how the powerful in a society dominate, or seek to control, less powerful groups, how the dominated groups occupy space, and confrontations that result from the domination. Post-structuralist geographers understand space as the product of ideologies or value systems of ruling elites.

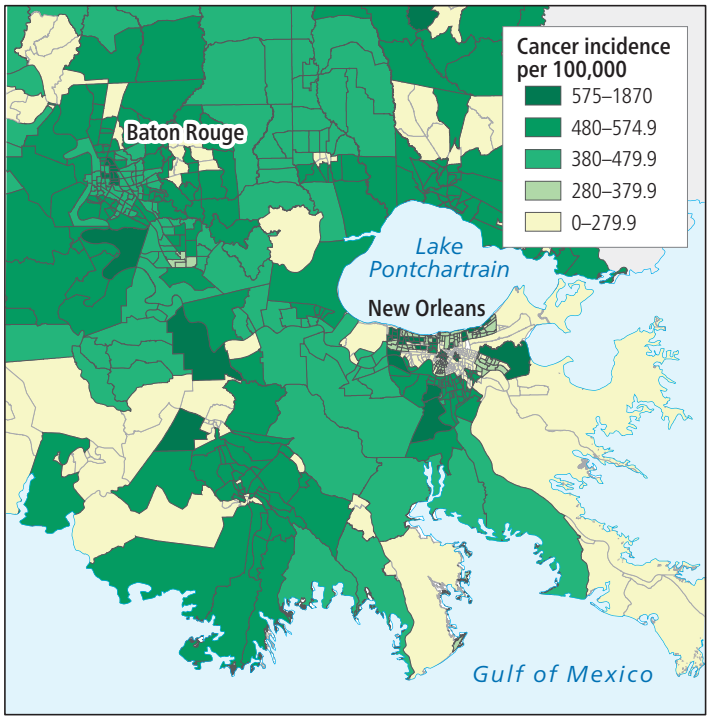
Some post-structuralist geographers have studied how, although it is illegal to discriminate against people of color, local governments have pursued policies that impose hazardous, polluting industries on minority neighborhoods. For example, a 137-kilometer (85-mile) corridor in Louisiana is known as "Cancer Alley" because cancer rates are around 50 percent higher than the national average. Most of the residents in the corridor are Black (Figure 1-38).

The high cancer rate is attributed to the toxic air emanating from the clustering of more than 150 petrochemical plants and refineries in the corridor. State officials approved the construction of some petrochemical facilities that did not meet the standards set by the U.S. Clean Air Act. In 2021, the United Nations defined Cancer Corridor as an example of environmental racism.

▲ **FIGURE 1-37 TOGETHER APART** Each watching something different.



(a)



(b)

▲ **FIGURE 1-38 CANCER CORRIDOR, LOUISIANA** (a) Percent Black; (b) cancer deaths.

KEY ISSUE

1.3 | Why Are Different Places Similar?

Geographers recognize that each place or region on Earth is in some ways unique, but they also recognize that human activities are rarely confined to one location. Three basic concepts—scale, space, and connections—help geographers explain that similarities among places and regions result from regularities rather than coincidences.

Scale: Global to Local

Learning Outcome 1.3.1 Relate the geographic concept of scale to economic and culture change.

Scale was defined at the beginning of the chapter as the relationship between the portion of Earth being studied and Earth as a whole. Geographers are especially concerned with contrasts between the local scale and the global scale.

Scale is an increasingly important concept in geography because of globalization, which is a force or process that involves the entire world and results in making something worldwide in scope. **Globalization** means that the scale of the world is shrinking – not literally in size, of course, but in the ability of a person, an object, or an idea to interact with a person, an object, or an idea in another place.

At the same time, geographers recognize the increasing importance of the local scale. In the face of globalization, groups of people are preserving and reviving traditional cultural characteristics and implementing distinctive economic practices.

Scale & Culture

Geographers observe that increasingly uniform cultural preferences produce uniform "global" landscapes of material artifacts and cultural values. Fast-food restaurants, service stations, and retail chains deliberately create a visual appearance that varies among locations as little as possible (Figure 1-39). That way, customers know what to expect, regardless of where in the world they happen to be.

Underlying the uniform cultural landscape is globalization of cultural beliefs and forms, especially religion and language. Many Africans, in particular, have moved away from traditional religions and have adopted Christianity or Islam, religions shared with hundreds of millions of people throughout the world. Globalization requires a form of common communication, and the English language is increasingly playing that role.

As more people become aware of elements of global culture and aspire to possess them, local cultural beliefs, forms, and traits may be practiced less often. The survival of a local culture's unique characteristics may be threatened by interaction with such social customs as wearing jeans and Nike shoes, consuming Coca-Cola and McDonald's hamburgers, and communicating using smartphones and computers.

Pause & Reflect 1.3.1 Give an example of a cultural activity or preference from another part of the world that has become popular among your friends or in your school.

(a)

(b)

▲ **FIGURE 1-39 GLOBALIZATION: DISNEYLAND AROUND THE WORLD** (a) Paris (b) Tokyo.

Creating Uniform Space

More uniform space can occur for several reasons:

Assimilation. The process by which a group's cultural features are altered to resemble those of another group is **assimilation**. With assimilation, the cultural features of one group may come to dominate the cultural features of another group (Figure 1-40).

Assimilation can take place on several scales, from that of an individual adjusting to life in a new culture, to the broader scales visible in urban areas, where larger segments of society interact with one another over time. Assimilation is not always voluntary, such as the governmental policy in the nineteenth century of forcibly assimilating Native Americans into the European-based culture of the United States.

Acculturation. The process of changes in culture that result from the meeting of two groups is **acculturation**. Changes may be experienced by both the interacting cultural groups with acculturation, but the two groups retain two distinct cultural features (Figure 1-41).

In order to fit in or to follow a social trend, an individual or group may adopt customs, practices, and behaviors of another group, but retain the more deep-seated and traditional values of their original culture. Examples are children of immigrants speaking English with school friends, while continuing to speak Arabic, Spanish, or Japanese at home with their parents.

Syncretism. The combining of elements of two groups into a new cultural feature is **syncretism**. With syncretism, the two cultural groups come together to form a new culture (Figure 1-42).

Viewing Other Cultures

Computers, tablets, and smartphones make it possible for individuals to set up their own connections through individually constructed networks such as Facebook and Twitter. At the touch of a button, we can transmit images and messages from one part of the world to our own personalized network around the world.

Modern networks make it possible for us to know more about what is happening elsewhere in the world, and space–time compression makes it possible for us to know it sooner. Distant places seem less remote and more accessible to us. With better connections between places, we are exposed to a constant barrage of cultural traits and economic initiatives from people in other regions, and perhaps we may adopt some of these cultural and economic elements. At the same time, others in the world can learn more about us, whether we like it or not.

▲ **FIGURE 1-40 ASSIMILATION** Vice President Kamela Harris visits a daycare center for recent immigrants, Washington D.C.

▲ **FIGURE 1-41 ACCULTURATION** Disney employees celebrate Chinese Lunar New Year.

▶ **FIGURE 1-42 SYNCRETISM** Kinpusen-ji Temple in Yoshino, Japan, is a place of worship for Shugendo, a syncretic religion that combines Buddhism and Shintoism (see Chapter 6).

Space: Distribution of Features

Learning Outcome 1.3.2 Compare three properties of distribution.

Space was defined at the beginning of the chapter as the physical gap or interval between two objects. The arrangement of a feature in space is known as its **distribution**. Geographers observe that many features are distributed across space in a regular manner, for discernible reasons.

Spatial thinking is the most fundamental skill that geographers possess to understand the arrangement of objects across Earth. When geographers observe the arrangements of people and activities found in space, they investigate why and how those distributions come to be.

Geographers explain how features such as buildings and communities are arranged across Earth. On Earth as a whole, or within an area on Earth, features may be numerous or scarce, close together or far apart. Geographers studying the arrangement of a feature in space are observing its distribution. Geographers identify three main properties of features as they are distributed across Earth – density, concentration, and pattern.

Distribution Properties: Density

Density is the frequency with which an object occurs in a defined space. The object could be people, houses, cars, trees, or anything else. The area could be measured in square kilometers, square miles, hectares, acres, or any other unit of area.

Keep in mind that a large number of objects does not necessarily lead to a high density. Density involves two measures – the number of objects and the size of the area. China is the country with the largest number of people – approximately 1.4 billion – but it does not have the world's highest density. The Netherlands, for example, has only 18 million people, but its density of around 525 persons per square kilometer (Figure 1-43) is much higher than China's 153 persons per square kilometer. The reason is that the land area of China is 9.6 million square kilometers, compared to only 42,000 square kilometers for the Netherlands.

High population density is also unrelated to poverty. The Netherlands is one of the world's most developed countries, and Mali one of the world's least developed. Yet the Netherlands' density of around 525 persons per square kilometer is much higher than Mali's density of 18 persons per square kilometer (see Chapter 2 for more about density).

▲ **FIGURE 1-43 HIGH DENSITY** Amstelplein, the Netherlands.

Distribution Properties: Concentration

The extent of an object's spread over space is its **concentration**. If the objects in an area are close together, they are clustered; if relatively far apart, they are dispersed. To compare the level of concentration most clearly, the two areas need to have the same number of objects and the same size area.

Geographers use concentration to describe changes in distribution. For example, the distribution of people across the United States is increasingly dispersed. The total number of people living in the United States is growing slowly – less than 1 percent per year – and the land area is essentially unchanged. But the population distribution is changing from relatively clustered in the Northeast to more evenly dispersed across the country.

Distribution Properties: Pattern

The third property of distribution is **pattern**, which is the geometric arrangement of objects in an area. Some objects are organized in a geometric pattern, whereas others are distributed irregularly. Geographers observe that many objects form a linear distribution, such as the arrangement of houses along a street or stations along a subway line.

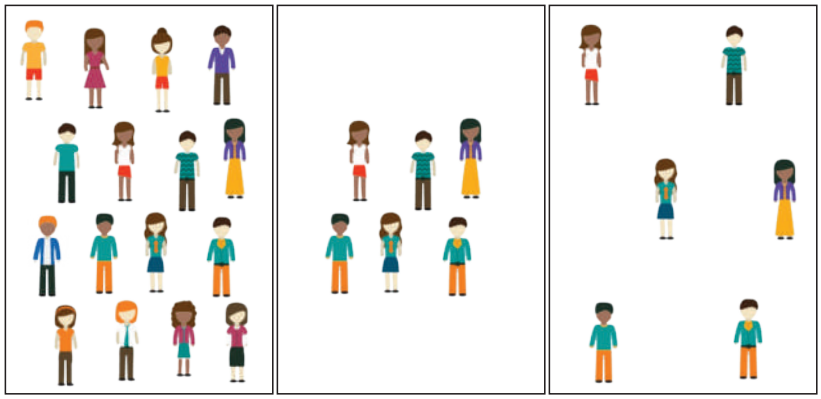
Some objects are purposefully arranged in a square or rectangular pattern. Many American cities contain a regular pattern of streets, known as a grid pattern, that intersect at right angles at uniform intervals to form square or rectangular blocks. For example, Washington D.C. was laid out in a grid pattern, along with several diagonal streets (Figure 1-44).

◀ **FIGURE 1-44 PATTERN** Aerial view from the 1901 Plan for Washington D.C.

Distribution Properties: Your Space

Understanding the difference between density and concentration became essential during the COVID-19 pandemic. Look back and remember a room you were in at a social gathering prior to the pandemic (Figure 1-45a). How many people were in the room? That number divided by the size of the room was the density. Were people spread evenly throughout the room, or were they huddled together in one part of the room? That was the concentration—either clustered or dispersed.

To stem the spread of a contagious, airborne disease such as COVID-19, the number of people in the same space should be limited—that is, the density reduced (Figure 1-45b). And to stop a COVID-19 outbreak from spreading, people should maintain a distance of 2 meters (6 feet) from each other—that is, the concentration must be dispersed (Figure 1-45c). In other words, people who practice what is known as social distancing, also called physical distancing, are keeping a safe space between each other in order to reduce the risk of spreading the highly contagious disease.



▲ **FIGURE 1-45 DISTRIBUTION OF PEOPLE DURING COVID-19 PANDEMIC** (a) High density (many people in a room) and high clustering (people close together) was unsafe. (b) Lowering the density was safer, but the high clustering was still unsafe. (c) Lowering the density and dispersing the concentration was safer.

Distribution of Baseball Teams

The distribution of major-league baseball teams illustrates the difference between density and concentration (Figure 1-46). After remaining unchanged during the first half of the twentieth century, the distribution of major league baseball teams changed during the second half of the twentieth century. The major leagues expanded from 16 to 30 teams in North America between 1960 and 1998, thus increasing the density. At the same time, 6 of the 16 original teams moved to other locations. In 1952, every team was clustered in the Northeast United States, but the moves dispersed several teams to the West Coast and Southeast. These moves, as well as the locations occupied by the expansion teams, resulted in a more dispersed distribution.

Pause & Reflect 1.3.2 Describe the distribution properties of your classroom.

◀ **FIGURE 1-46 DISTRIBUTION OF BASEBALL TEAMS** The changing distribution of North American baseball teams illustrates the difference between density and concentration. As a result of these relocations and additions, the density of teams increased, and the distribution became more dispersed.

These 6 teams moved to other cities during the 1950s and 1960s:

Braves—Boston to Milwaukee in 1953, then to Atlanta in 1966
Browns—St. Louis to Baltimore (Orioles) in 1954
Athletics—Philadelphia to Kansas City in 1955, then to Oakland in 1968
Dodgers—Brooklyn to Los Angeles in 1958
Giants—New York to San Francisco in 1958
Senators—Washington to Minneapolis (Minnesota Twins) in 1961

These 14 teams were added between the 1960s and 1990s:

Angels—Los Angeles in 1961, then to Anaheim (California) in 1965
Senators—Washington in 1961, then to Dallas (Texas Rangers) in 1971
Mets—New York in 1962
Astros—Houston (originally Colt .45s) in 1962
Royals—Kansas City in 1969
Padres—San Diego in 1969
Expos—Montreal in 1969, then to Washington (Nationals) in 2005
Pilots—Seattle in 1969, then to Milwaukee (Brewers) in 1970
Blue Jays—Toronto in 1977
Mariners—Seattle in 1977
Marlins—Miami (originally Florida) in 1993
Rockies—Denver (Colorado) in 1993
Rays—Tampa Bay (originally Devil Rays) in 1998
Diamondbacks—Phoenix (Arizona) in 1998

Space & Economic Patterns

Learning Outcome 1.3.3 Analyze geographic approaches to global and local economic patterns.

A few people living in very remote regions of the world may be able to provide themselves with all of their daily necessities. But most economic activities undertaken in one region are influenced by interaction with decision-makers located elsewhere. The choice of crop is influenced by demand and prices set in global markets. The factory is located to facilitate bringing in raw materials and shipping out products to the markets.

Globalization of the economy has been led primarily by transnational corporations, sometimes called multinational corporations. A **transnational corporation** conducts research, operates, factors, and sells products in many countries, not just where its headquarters and principal shareholders are located. An example is the Toyota Motor Corporation (Figure 1-47).

Every place in the world is part of the global economy, but globalization has led to more specialization at the local level. Each place plays a distinctive role, based on its local assets, as assessed by transnational corporations. A locality may be especially suitable for a transnational corporation to conduct research, to develop new engineering systems, to extract raw materials, to produce parts, to store finished products, to sell them, or to manage operations. In a global economy, transnational corporations remain competitive by correctly identifying the optimal location for each of these activities. Factories are closed in some locations and. opened in others, and distinctive products are tailored to local markets (Figure 1-48).

Changes in production have led to a spatial division of labor in which a region's workers specialize in particular tasks. Transnationals decide where to produce things in response to characteristics of the local labor force, such as level of skills, prevailing wage rates, and attitudes toward unions. Transnationals may close factories in locations with high wage rates and strong labor unions. Particular production tasks are clustered in specific geographic areas.

FIGURE 1-47 TRANSNATIONAL CORPORATION: TOYOTA MOTOR CORPORATION SALES AND VEHICLE ASSEMBLY PLANTS

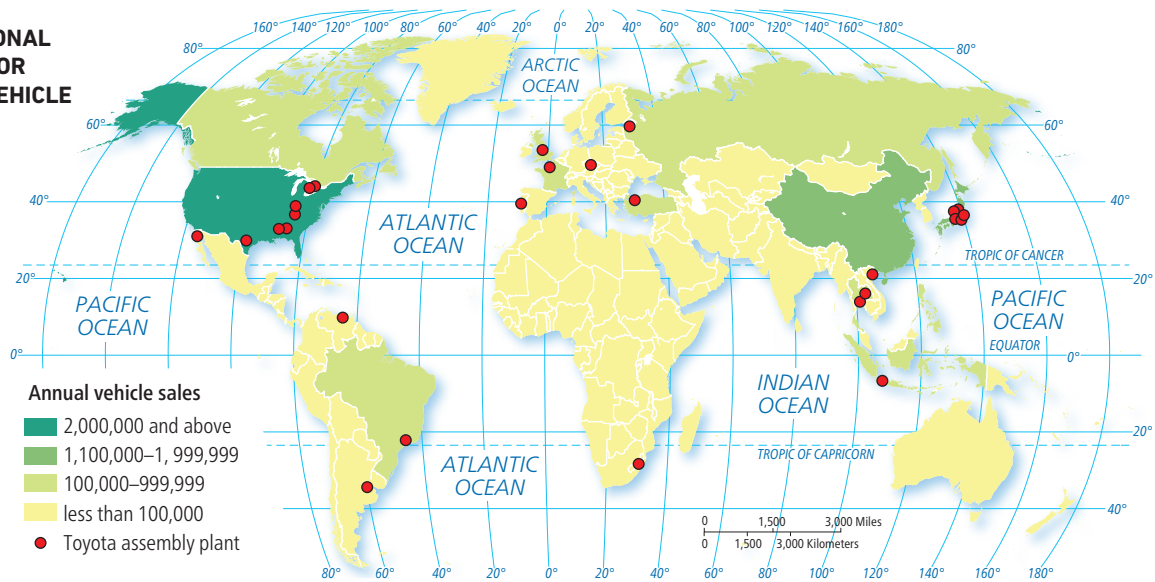


FIGURE 1-48 TRANSNATIONAL CORPORATION: LOCAL DIVERSITY Toyota produces different vehicles around the world. (a) Sienta, a mini SUV, is sold in Japan and Southeast Asia. (b) Etios, a small car, is sold in Argentia, Brazil, India, Indonesia, and South Africa. (c) Sequoia, a large SUV, is sold in North America.

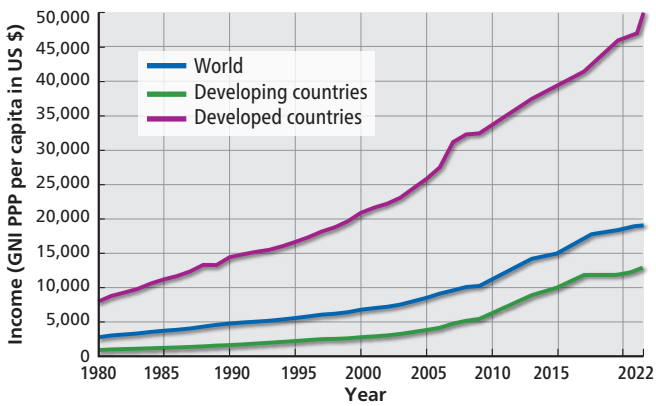
Uneven Development

Global culture and economy are increasingly centered on the three core, or hearth, regions of North America, Europe, and East Asia. These three regions have a large percentage of the world's advanced technology, capital to invest in new activities, and wealth to purchase goods and services. Surrounding the core are developing countries on the periphery with limited access to the world centers of consumption, communications, wealth, and power, which are clustered in the core (refer to Figure 9-40). The increasing gap in economic conditions between regions in the core and periphery that results from the globalization of the economy is known as **uneven development** (Figure 1-49).

From "command centers" in the three major world cities of New York, London, and Tokyo, key decision-makers employ modern telecommunications to send orders to factories, shops, and research centers around the world—an example of hierarchical diffusion (discussed later in this chapter). Meanwhile, "nonessential" employees of the companies can be relocated to lower-cost offices outside the major financial centers. For example, Apple maintains corporate headquarters in Cupertino, California, but most of the parts in its phones, tablets, and computers are made in Asian countries, primarily China, India, Japan, and South Korea.

People in peripheral regions, who once toiled in isolated farm fields to produce food for their families, now produce crops for sale in core regions or have given up farm life altogether and migrated to cities in search of jobs in factories and offices. As a result, the global economy has produced greater disparities than in the past between the levels of wealth and well-being enjoyed by people in the core and in the periphery.

In a global culture and economy, every area of the world plays some role intertwined with the roles played by other regions. Workers and cultural groups that in the past were largely unaffected by events elsewhere in the world now share a single economic and cultural world with other workers and cultural groups. For example, the fate of an autoworker in Detroit is tied to investment decisions made in Mexico City, Seoul, Stuttgart, and Tokyo.



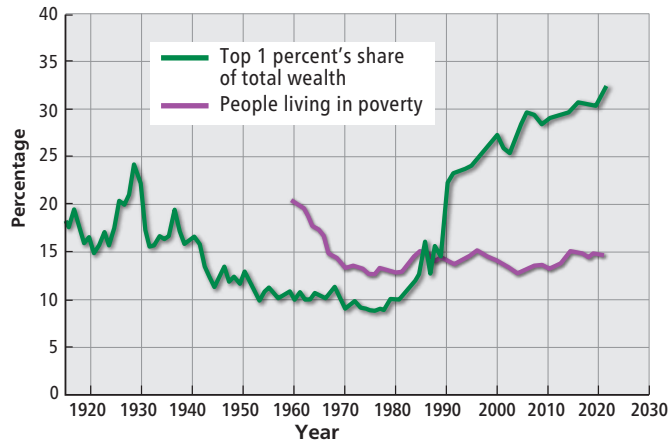
▲ **FIGURE 1-49 INEQUALITY: INCOME GAP BETWEEN DEVELOPED COUNTRIES AND DEVELOPING COUNTRIES** Income per capita has increased much more rapidly in developed countries than in developing ones. Chapter 9 discusses specific ways to measure economic differences, including GNI PPP.

Inequality Within Countries

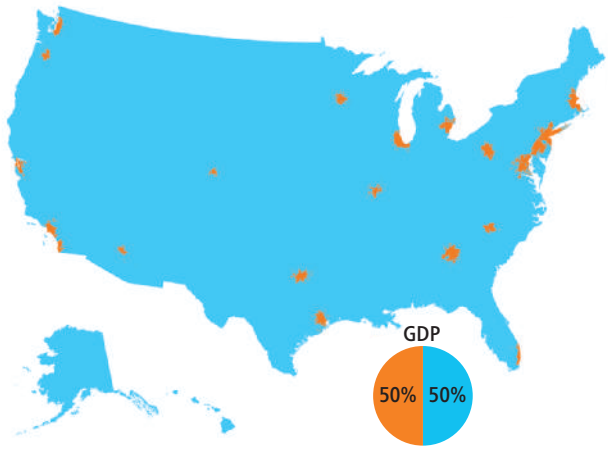
Unequal access and economic inequality have also increased within countries. In the United States, the share of the national income held by the wealthiest 1 percent increased from 24 percent in 1979 to 32 percent in 2021, according to the Federal Reserve Bank (Figure 1-50). The share of Americans living in poverty has increased during that same period from 12 percent to 13 percent.

Inequality in the distribution of wealth within the United States was mapped in an innovative way by Sasha Trubetskoy, when he was an undergraduate at the University of Chicago. One-half of the economic activity in the United States is clustered in a handful of small areas comprising well under 1 percent of the country's land area (Figure 1-51).

Pause & Reflect 1.3.3 What sorts of places are the small orange clusters on Figure 1-51?



▲ **FIGURE 1-50 INEQUALITY: INCOME GAP WITHIN THE UNITED STATES** The share of wealth held by the wealthiest 1 percent in the United States declined from the 1930s through the 1970s and began rising in the 1980s. The percentage of people living in poverty declined during the 1960s but has remained relatively unchanged since then.



▲ **FIGURE 1-51 INEQUALITY WITHIN THE UNITED STATES** The map created by Sasha Trubetskoy shows that one-half of the economic activity in the United States is clustered in a handful of urban areas, especially along the East and West Coasts.

Space: Gender Identity

Learning Outcome 1.3.4 Analyze geographic approaches to important elements of cultural identity.

Patterns in space vary according to gender, ethnicity, and sexuality. Geographers study these cultural traits because they are important in explaining why people sort themselves out in space and move across the landscape in distinctive ways.

Gender & Sex

People often use "sex" and "gender" interchangeably, but the two terms are actually different. A newborn baby's sex is typically either male or female, depending on biological features. In a small number of cases, a baby is born with biological features of both male and female. The United Nations defines gender as the social attributes and opportunities associated with being male and female as well as relationships between women and men. The U.N. points out that women and men are typically assigned different and unequal responsibilities and different decision-making opportunities in society. They undertake different activities and have access to and control over different resources.

As society creates masculine and feminine identities, based on certain cultural features such as norms, roles, and relationships, it also leads to stereotypes of beliefs, attitudes, and assumptions about males and females. Geographer Marcia England points out that the media plays a subtle yet pervasive role in establishing and reinforcing gender stereotypes in popular TV programs. When individuals do not "fit" established gender stereotypical norms, they can face stigma or exclusion. These groups seek out safe spaces where they are free from discriminatory practices and violence.

Gender is an example of a **social construction**, which is an idea that has been created and widely accepted by the people in a society. Constructs are seen as natural by the society but may or may not represent a reality shared by all individuals in that group. These attitudes vary from society to society and across time and can be changed.

Gender Roles

Girls and boys learn through a socialization process the gender roles that they are expected to follow in the home, community, and workplace of a given society. These gender norms are beliefs about males and females that are passed from generation to generation through processes of socialization. Gender relations refer to social relations between and among women and men that are based on gender norms and roles. Expectations about gender relations often create hierarchies between and among groups of men and women that can lead to unequal power relations, advantaging one group over another.

Distinctive spatial patterns by gender, ethnicity, and sexual orientation are constructed by the attitudes and actions of cultural groups as well as the larger society. For example, consider the implications for gender roles of the spatial patterns associated with some American households.

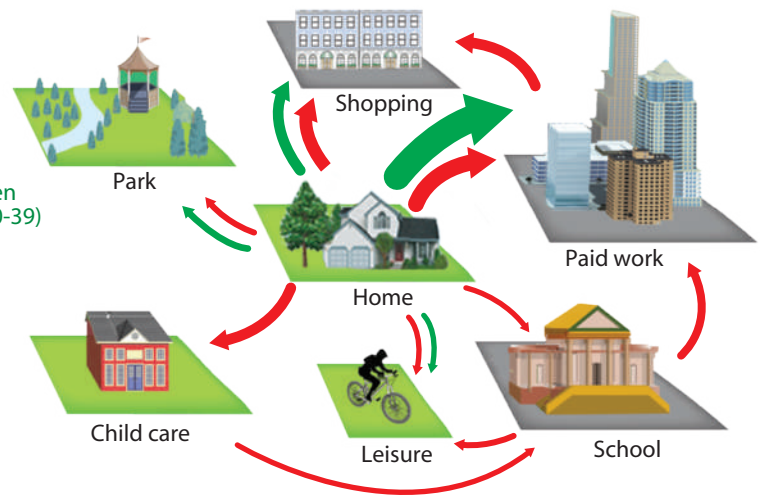
The husband gets in his car in the morning and drives from home to work, where he parks the car and spends the day. In the late afternoon, he collects the car and drives home. The location of the home may have been selected to ease his daily commute to work.

The wife may also work outside the home, resulting in a complex pattern of moving across urban space. Where is her job located? If the family house was selected for access to her husband's place of employment, she may need to travel across town. Yet the wife is often the one who drives the children to school in the morning, walks the dog, and drives to the supermarket. In the afternoon, she may drive the children from school to sports practice or music lessons. Who leaves work to take a child to a doctor's office? Who takes a day off work when a child is home sick? Who needs but may not be entitled to extended time off from work to give birth and nurse the newborn child?

The U.K. Department of Transport conducts an annual survey of why people travel in that country. According to the survey, women ages 30 to 39 on average are more likely than men to take trips for taking care of children and other family members. Men ages 30 to 39 on average take more trips to commute to and from work than do women (Figure 1-52).

FIGURE 1-52 TRIPS BY PURPOSE AND GENDER, AGES 30–39, UNITED KINGDOM

	Women (30-39)	Men (30-39)
Paid work	30%	50%
Care work	20%	7%
Lesisure	24%	21%
Shopping	15%	13%
Other	11%	9%



Geographic Thought & Identity

Geographers take a range of approaches to cultural identity and inequality. **Humanistic geography** emphasizes the values that people hold, according to geographer Anne Buttimer. Individuals form ideas about places in different ways and give those places symbolic meanings. For example, LGBTQ people may be attracted to places such as the Castro District in San Francisco because they perceive them as LGBTQ-friendly spaces where they can interact socially with other LGBTQ people. The Castro may be seen as offering an accepting location for LGBTQ people through inclusive policies and business practices.

Behavioral geography emphasizes the importance of understanding the psychological basis for individual human actions in space. Distinctive spatial patterns by gender, ethnicity, and sexual orientation are constructed by the attitudes and actions of cultural groups as well as the larger society.

Distribution by Gender

With gender, geographers focus on the distribution of inequality. Gender equality refers to equal chances or opportunities for women to access and control social, economic, political, and health care resources (Figure 1-53). Gender equity refers to the different needs, preferences, and interests of women and men. This may mean that different treatment is needed to ensure equality of opportunity. Any distinction, exclusion, or restriction (such as unfair or unequal treatment) made based on gender norms, roles, and relations prevents women and men from enjoying their human rights. Gender inequality is often perpetuated by legitimizing and institutionalizing stereotypes or norms associated with different ages or groups of men and women.

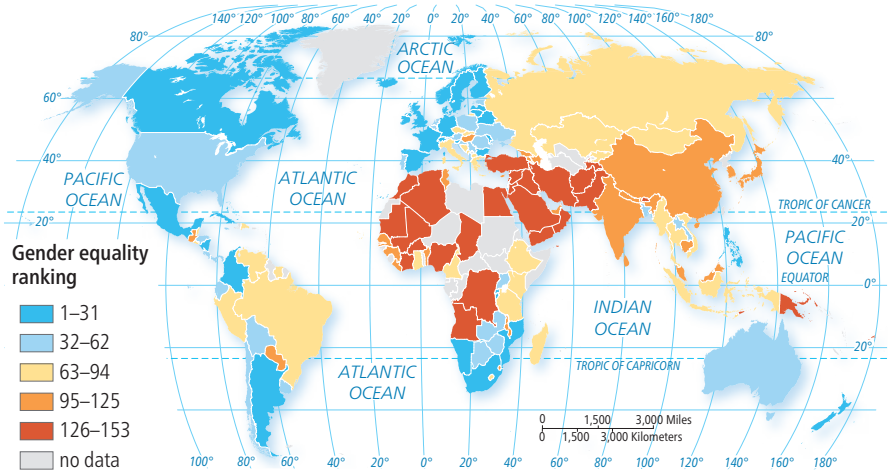
As discussed in detail in Chapter 9, gender inequality is reflected in numerous factors. The U.N. has not found a single country in the world where the average income earned by women exceeds that earned by men. Worldwide, the average income of women is around 52 percent that of men. At best, women in some countries have achieved near-equality with men. This small group of countries includes Canada, several developed countries in Europe, and a few developing countries with relatively low incomes. The gender equality gap is especially large in Southwest Asia & North Africa, where women's participation in the economy and society are subject to restrictions.

Pause & Reflect 1.3.4 Using your own campus or school as the example, describe how movement across space varies during the day for students and faculty.

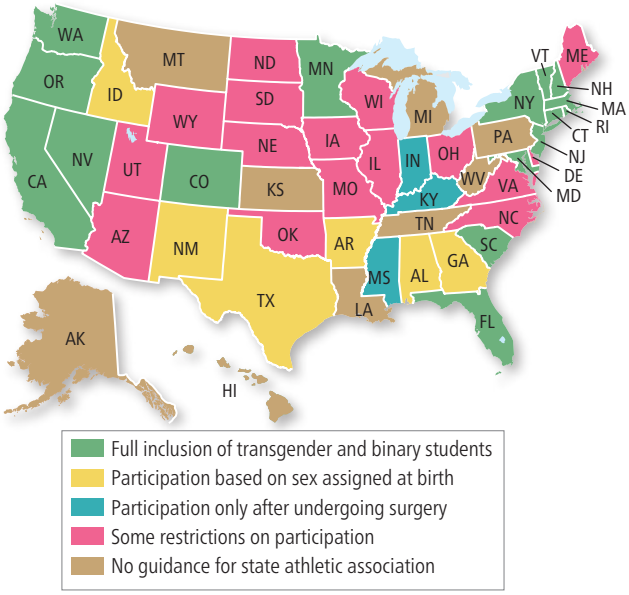
Distribution by Gender Identity

A transgender person is someone whose gender identity or gender expression does not correspond with the sex they were assigned at birth. Some transgender people identify with the opposite of their birth sex, whereas others identify as nonbinary – that is, neither female nor male.

Transgender people may face discrimination in some daily activities. For example, some states do not permit transgender and nonbinary students to participate in school athletics (Figure 1-54).



▲ **FIGURE 1-53 GENDER GAP** The World Economic Forum Gender Gap combines four measures of gender parity: economic participation & opportunity, educational attainment, health & survival, and political empowerment. A lower number means less of a gap between women and men.



▲ **FIGURE 1-54 TRANSGENDER LAWS** States vary widely in their inclusion or exclusion of transgender and nonbinary students from school athletics.

Space: Cultural Identity

Learning Outcome 1.3.5 Discuss geographic approaches to ethnicity and sexuality as important elements of cultural identity.

In addition to income and gender, sexual orientation and ethnicity are important elements of cultural identity. Geographers study various elements of cultural identity because they help explain why people sort themselves out in space and move across the landscape in distinctive ways.

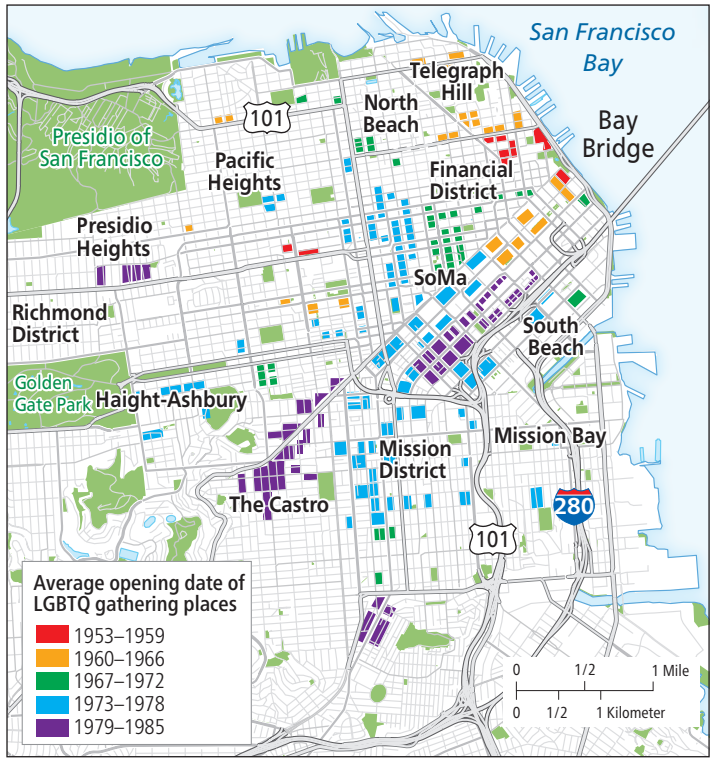
Distribution by Sexual Orientation

Openly lesbian, gay, bisexual, transgender, and queer (or questioning) people may be attracted to some locations that reinforce identity through spatial interaction with other LGBTQ people. Spatial interaction and a supporting environment for cultural identity can take place at many scales: neighborhood, city, state, and country.

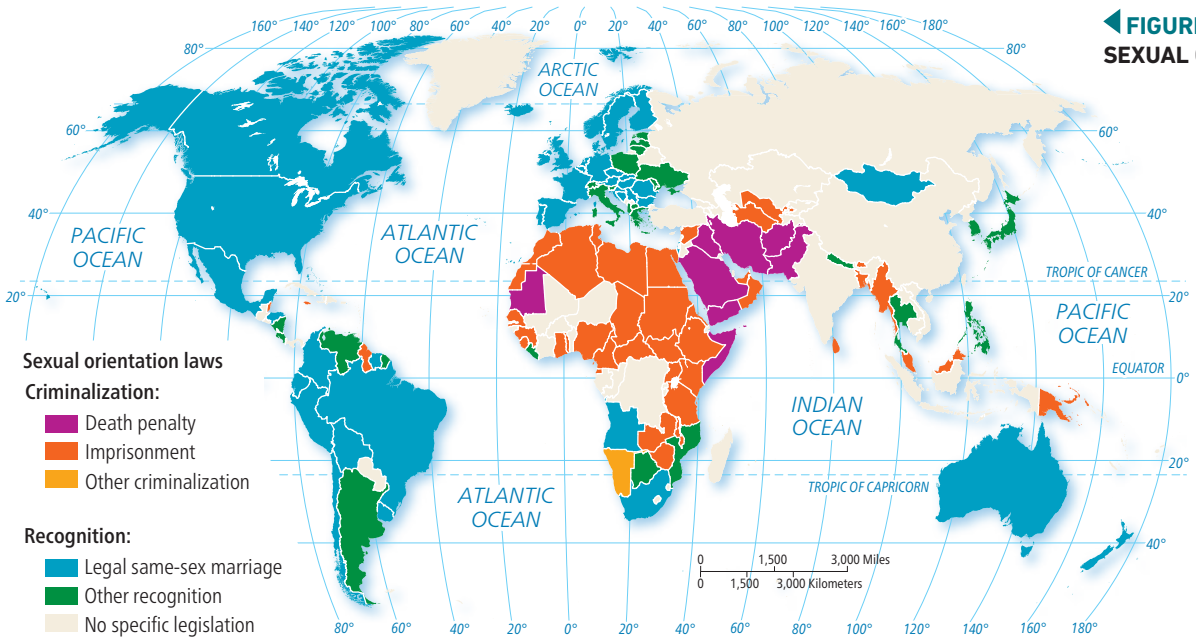
Among the 50 largest U.S. cities, the percentage of LGBTQ people varies from 6.2 percent in the San Francisco metropolitan area to 2.6 percent in Birmingham, Alabama. San Francisco, which has a reputation for being an especially hospitable city for LGBTQ people, has neighborhoods such as the Castro that have especially strong LGBTQ identities (Figure 1-55).

LGBTQ Discrimination & Protection

At the international scale, the International Lesbian, Gay, Bisexual, Trans and Intersex Association (ILGA) identifies laws that discriminate or protect based on sexual orientation or gender identity. Some countries protect LGBTQ people, whereas other countries criminalize them (Figure 1-56). In 2021, ILGA classified 67 countries as criminalizing LGBTQ people, including 10 that imposed the death penalty: Afghanistan, Iran, Mauritania, Nigeria (in the north), Pakistan, Qatar, Saudi Arabia, Somalia, UAE, and Yemen.



▲ **FIGURE 1-55 OPENING DATES OF LGBTQ GATHERING PLACES, SAN FRANCISCO**



◀ **FIGURE 1-56 DISTRIBUTION OF SEXUAL ORIENTATION LAWS**

Distribution by Ethnicity

Geographers are especially interested in ethnic identity because it is closely tied to the cultural traditions of a particular location on Earth, as discussed in more detail in Chapter 7. That chapter also discusses how the distribution of ethnicities in the United States varies considerably at all scales and how, for historic reasons, Black Americans are clustered in the Southeast, whereas Hispanic Americans are clustered in the Southwest. In the United States, urban areas are more ethnically diverse than rural areas (see Chapters 7 and 13).

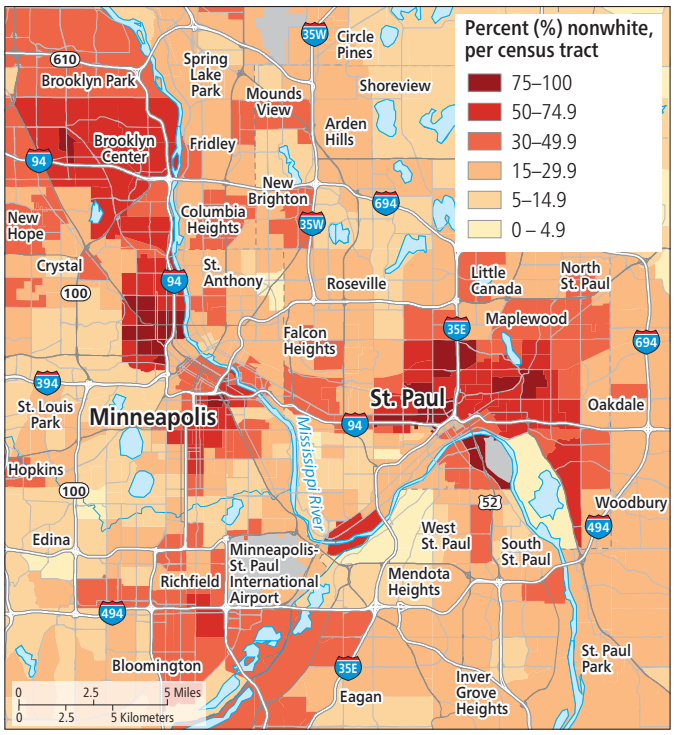
Race, like ethnicity, is a social construction, but the two have different meanings. Ethnic identity is tied to a particular place, whereas racial identity is a social construction built around perception of a physiological trait, such as skin color. However, some cultures have further assigned racial identity a geographic feature through legalizing spatial segregation and other discriminatory practices.

Black Lives Matter

Black Lives Matter is a movement that campaigns to stop violence and perceived discrimination against Black people and educates others about the challenges that Black Americans face in the United States. Founded on social media with #BlackLivesMatter in 2013 by Alicia Garza, Patrisse Cullors, and Opal Tometi, Black Lives Matter may be the largest civil rights movement in U.S. history.

In Minneapolis during 2020, Black Lives Matter protests occurred in reaction to the death that year of George Floyd, a 46-year-old Black man. Floyd was killed during an arrest, after Minneapolis Police Department officer Derek Chauvin knelt on Floyd's neck for nearly eight minutes as three other officers looked on and prevented passersby from intervening.

The Twin Cities (Minneapolis and Saint Paul), like many U.S. urban areas, are characterized by a high degree of clustering based on racial identity. For example, Black people are highly clustered in the northwest side of Minneapolis and the east side of Saint Paul (Figure 1-57).



▲ **FIGURE 1-57 DISTRIBUTION OF RACES IN THE TWIN CITIES**

Distribution of Ethnicities in Ukraine

Ethnic identity played an important role in Russia's war against the independent country of Ukraine. Russia's President Vladimir Putin justified Russia's seizure of the Crimea region of Ukraine in 2014 and invasion of other regions of Ukraine in 2022 because, he claimed, Russians and Ukrainians shared identical ethnic identities. Because of the alleged shared ethnic identities, Putin asserted, Ukraine should be joined with Russia.

The eastern portion of Ukraine does in fact contain a large number of people who identified as Russian rather than Ukrainian (Figure 1-58). But the vast majority of the 44 million citizens of Ukraine identify their ethnicity as Ukrainian, not Russian. As a result, Ukrainians fought hard to repel the Russian invaders, and most other countries condemned Russia's invasion of its neighboring country.

All academic disciplines and workplaces have proclaimed sensitivity to issues of cultural diversity. For geographers, concern and deep respect for cultural diversity are not merely a politically correct expediency; they lie at the heart of geography's understanding of space. Geographers have deep respect for the dignity and equality of all cultural groups.

Pause & Reflect 1.3.5 Describe the relationship between ethnicity and location or spatial distribution in the area where you live.

▲ **FIGURE 1-58 DISTRIBUTION BY ETHNICITY IN UKRAINE**

KEY ISSUE

1.4 | Why Are Different Places Connected?

Geography is distinctive because it encompasses both social science (human geography) and natural science (physical geography). This text focuses on human geography but doesn't forget that humans are connected with Earth's atmosphere, land, water, and vegetation as well as with its other living creatures.

Connections: Diffusion

Learning Outcome 1.4.1 Describe the various ways that features can spread through diffusion.

Connection was defined at the beginning of the chapter as relationships among people and objects that cross the barrier of space. Geographers are concerned with the various means by which connections occur. More rapid connections have reduced the distance across space between places, not literally in miles, of course, but in time.

Hearths

The process by which a feature spreads across space from one place to another over time is called **diffusion**. A feature originates at a hearth and diffuses from there to other places. A **hearth** is a place from which an innovation originates. Geographers document the location of hearths and the processes by which diffusion connects things in a hearth to elsewhere over time.

How does a hearth emerge? A cultural group must be willing to try something new and must be able to allocate resources to nurture the innovation. To develop a hearth, a group of people must also have the technical ability to achieve the desired idea and the economic structures, such as financial institutions, to facilitate implementation of the innovation.

As discussed in subsequent chapters, geographers can trace the dominant cultural, political, and economic features of the contemporary United States and Canada primarily to hearths in Europe and Southwest Asia. Other regions of the world also contain important hearths. In some cases, an idea, such as an agricultural practice, may originate independently in more than one hearth. In other cases, hearths may emerge in two regions because two cultural groups modify a shared concept in two different ways.

For a person, an object, or an idea to have a connection with persons, objects, or ideas in other regions, diffusion must occur. Geographers observe two basic types of diffusion: relocation and expansion.

Relocation Diffusion

The spread of an idea through physical movement of people from one place to another is termed **relocation diffusion**. We shall see in Chapter 3 that people migrate for a variety of political, economic, and environmental reasons. When they move, they carry with them their culture, including language, religion, and ethnicity.

The most commonly spoken languages in North and South America are Spanish, English, Portuguese, and French, primarily because several hundred years ago Europeans who spoke those languages comprised the largest number of migrants. Thus, these languages spread through relocation diffusion. We will examine the diffusion of languages, religions, and ethnicity in Chapters 5 through 7.

Introduction of a common currency, the euro, in 12 European countries in 2002 gave scientists an unusual opportunity to measure relocation diffusion from hearths (Figure 1-59). Although a single set of paper money was issued, each of the 12 countries minted its own coins in proportion to its share of the region's economy. A country's coins were initially distributed only inside its borders, although the coins could also be used in the other 11 countries. Scientists in France took month-to-month samples to monitor the proportion of coins from each of the other 11 countries. The percentage of coins from a particular country is a measure of the level of relocation to and from France.

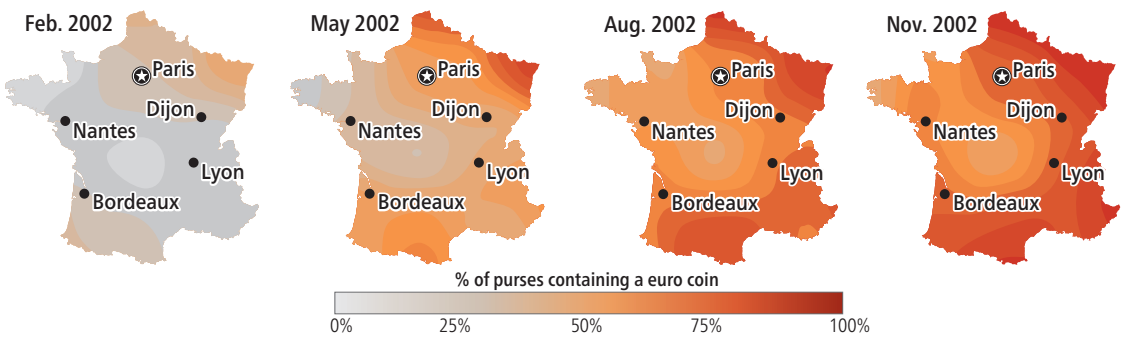


FIGURE 1-59 RELOCATION DIFFUSION Diffusion of euro newly minted coins in France, 2002. Euro coins minted in other countries first appeared in France near its borders with other countries, where connections between people in neighboring countries would be more frequent.

Expansion Diffusion

The spread of a feature from one place to another in an additive process is **expansion diffusion**. This expansion may result from one of three processes: hierarchical diffusion, contagious diffusion, or stimulus diffusion.

Hierarchical Diffusion. The spread of an idea from persons or nodes of authority or power to other persons or places is **hierarchical diffusion**. Hierarchical diffusion may result from the spread of ideas from political leaders, socially elite people, or other important persons to others in the community. people, or other important persons to others in the community. Innovations may also originate in a particular node or core region of power, such as a large urban center, and diffuse later to isolated rural areas on the periphery.

Electronic communications have facilitated hierarchical diffusion of information from managers to employees working in many locations. Virtual meetings became especially important during the COVID-19 pandemic, when corporations closed their offices and employees worked from home (Figure 1-60).

Contagious Diffusion. The rapid, widespread diffusion of a characteristic throughout the population is **contagious diffusion**. As the term implies, this form of diffusion is analogous to the spread of a contagious disease, such as COVID-19. Contagious diffusion spreads like a wave among fans in a stadium, without regard for hierarchy and without requiring permanent relocation of people. New music or an idea goes viral because web surfers throughout the world have access to the same material simultaneously (Figure 1-61). Contagious diffusion through the internet or social media is known as a **meme.**

For example, through widespread simultaneous diffusion, something is identified as cheugy (out of date or trying too hard). Clothing is especially subject to cheugy. An example of something becoming cheugy through contagious diffusion, especially through TikTok, is the wearing of skinny jeans by older people (Figure 1-62).

▲ **FIGURE 1-60 HIERARCHICAL DIFFUSION** During the COVID-19 pandemic, when many offices were closed, the leaders of corporations could communicate with their staff through virtual meetings.

▲ **FIGURE 1-61 CONTAGIOUS DIFFUSION: ELECTRIC SCOOTER** The electric scooter was invented in China and quickly diffused to other places, including London, England, where parking spaces have been designated.

Stimulus Diffusion. The spread of an underlying principle even though a characteristic of it apparently fails to diffuse is **stimulus diffusion**. For example, innovative features of Apple's iPhone and iPad have been adopted by competitors. McDonald's has around 40,000 restaurants located in around 119 countries, but its menu differs depending on the location. The underlying principle of a McDonald's meal is present in each restaurant, but as McDonald's have diffused around the world, the company adjusts the specific menu to best fit local preferences.

Expansion diffusion occurs much more rapidly in the contemporary world than it did in the past. Hierarchical diffusion is encouraged by modern methods of communication, such as computers, texting, blogging, tweeting, and e-mail. Contagious diffusion is encouraged by use of the internet, especially the World Wide Web. Stimulus diffusion is encouraged by all of the new technologies.

Pause & Reflect 1.4.1 U.S. coins in general circulation are minted in either Denver or Philadelphia. Take a look at your coins. Do you have more from the mint closer to you? Why might that be?

▲ **FIGURE 1-62 CONTAGIOUS DIFFUSION: CHEUGY** Skinny jeans on sale in a department store.

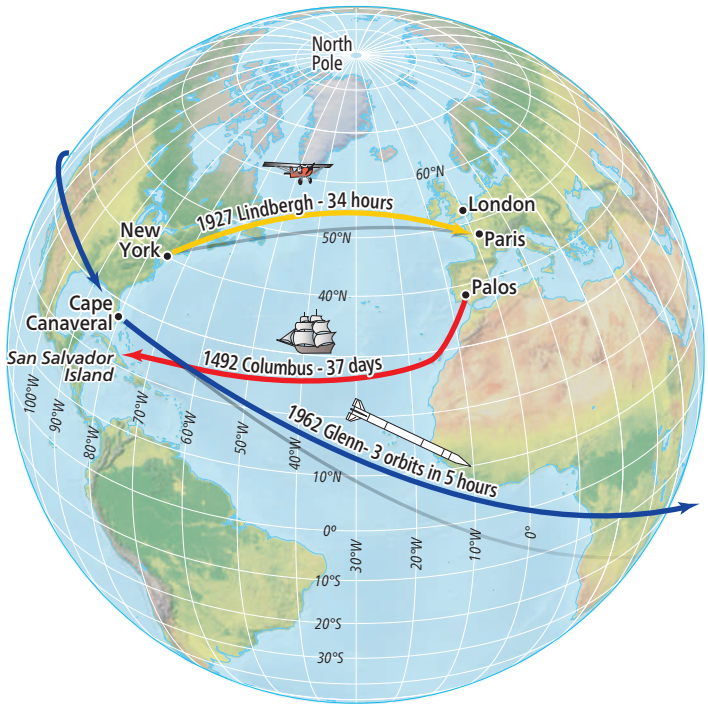
Connections: Spatial Interaction

Learning Outcome 1.4.2 Explain how places are connected through networks.

The farther away someone is from another, the less likely the two are to interact. Contact diminishes with increasing distance and eventually disappears. This trailing-off phenomenon is called **distance decay**. In the contemporary world, distance decay is much less severe because connection between places takes much less time. Geographers apply the term **space–time compression** to describe the reduction in the time it takes for something to reach another place (Figure 1-63).

In the past, most connections among cultural groups required the physical movement of settlers, explorers, and plunderers from one location to another. As recently as 1800 C.E., people traveled in the same ways and at about the same speeds as in 1800 B.C.E. – they were carried by an animal, took a sailboat, or walked.

To be connected with another place in the modern world, we may not need to travel at all. Ideas that originate in a hearth are now able to diffuse rapidly to other areas through communications networks. One example is the TV network (for example, BBC in the United Kingdom, CBC in Canada, and NBC in the United States), which comprises a chain of stations simultaneously broadcasting to distant places the same program, such as a football game. Through a communications network, diffusion from one place to another is instantaneous in time, even if the physical distance between places – as measured in kilometers or miles – is large.

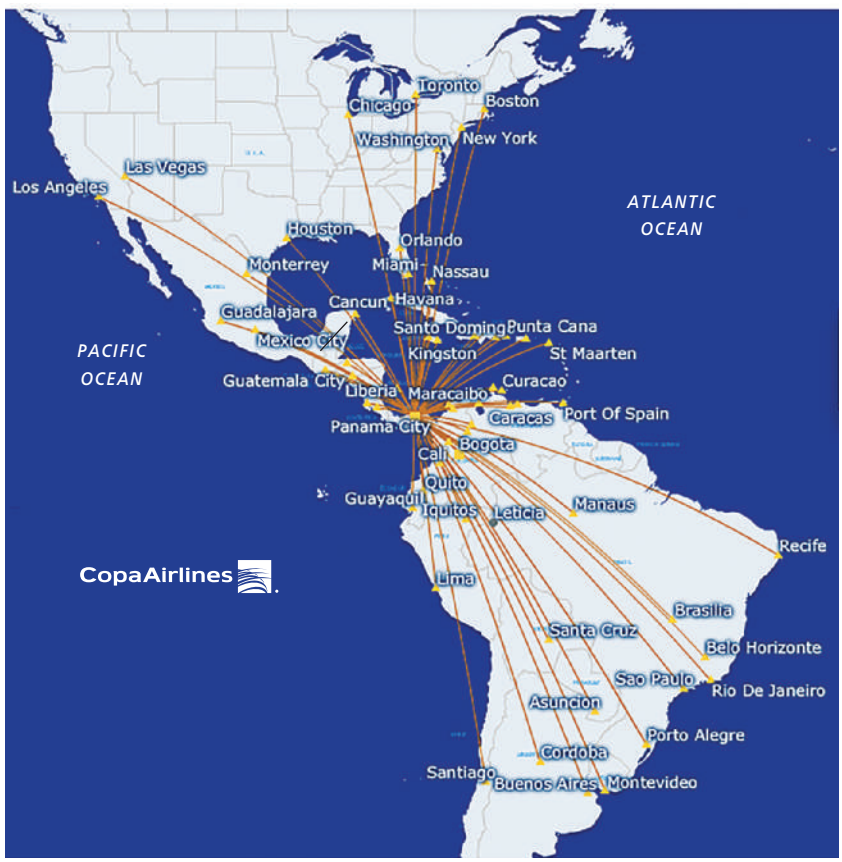


▲ **FIGURE 1-63 SPACE–TIME COMPRESSION** Transportation improvements have shrunk the world. In 1492, Christopher Columbus took nearly 900 hours (37 days) to sail across the Atlantic Ocean. In 1927, Charles Lindbergh was the first to fly nonstop across the Atlantic, taking 33.5 hours. In 1962, John Glenn, the first American to orbit in space, crossed above the Atlantic in about 1/2 hour and circled the globe three times in 5 hours.

Networks

Interaction takes place through a **network**, which is a chain of communication that connects places. A major airline, for example, typically has a network known as "hub-and-spokes" (Figure 1-64). With a hub-and-spokes network, an airline flies planes from a large number of places into one hub airport within a short period of time and then a short time later sends the planes to another set of places. In principle, travelers originating in relatively small towns can reach a wide variety of destinations by changing planes at the hub airport.

Pause & Reflect 1.4.2 Is your nearest airport a hub? If not, to what hubs is your nearest airport connected?



▶ **FIGURE 1-64 SPATIAL INTERACTION: AIRLINE HUB-AND-SPOKE NETWORK** Copa Airlines flies from a large number of places into a hub airport in Panama, and a short time later sends the planes to another set of places.

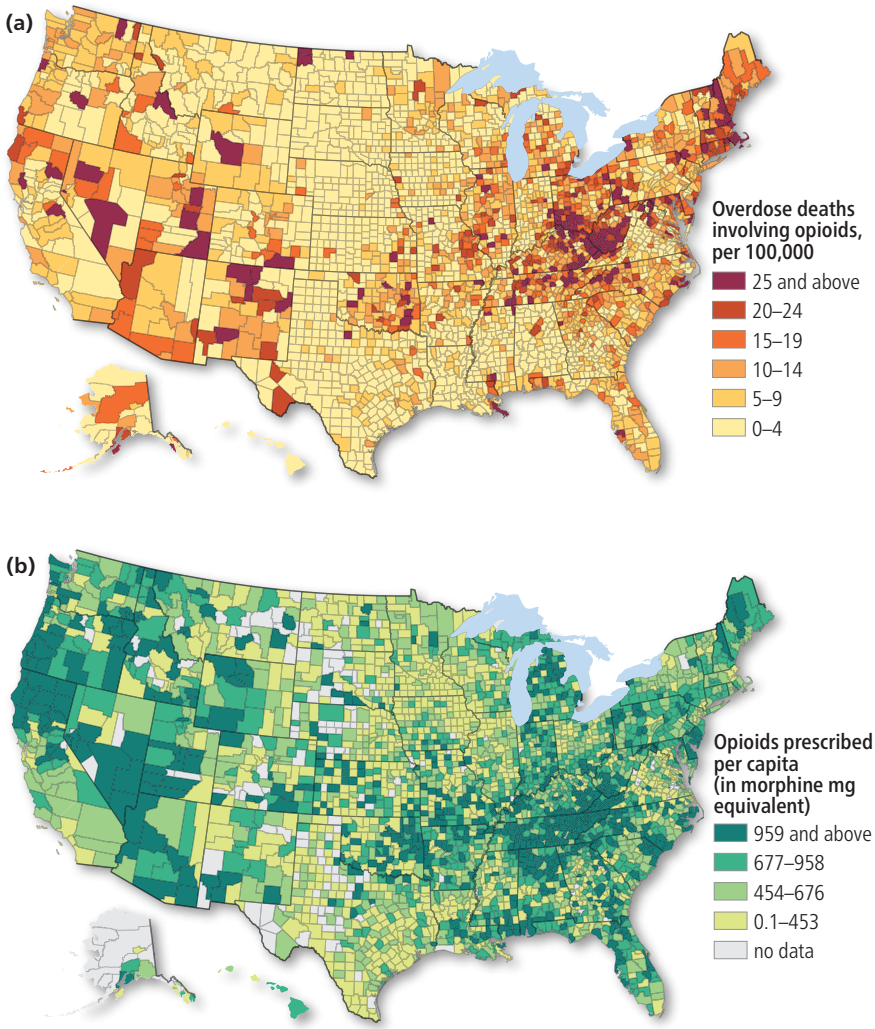
Spatial Association

A region gains meaning through its unique combination of features. The presence of some of these features may be coincidental, but others are related to each other. **Spatial association** is observed within a region if the distribution of one feature is related to the distribution of another feature. Spatial association is strong if two features have very similar distributions, and spatial association is weak if two features have very different distributions.

To illustrate spatial association, Figure 1-65 displays the distribution of two features related to the opioid epidemic crisis in the United States. Is the spatial association between the two maps strong or weak?

The term *opioid* encompasses opiates, which are drugs, such as heroin, derived from the opium poppy plant. The term also encompasses synthetic substances manufactured into pain-management medications. The use of opioids increased rapidly in the late 1990s. Many doctors prescribed opioids for their patients, especially those who complained of chronic pain. Opioids became the most prescribed class of medications in the United States. Many of these patients became addicted to the opioids.

As the number of opioid users has increased in recent years, international criminal organizations known as drug cartels began flooding the United States with imported heroin from Mexico as well as synthetically manufactured opioids such as fentanyl. Addicted individuals found that these illegal sources were cheaper, more potent, and easier to acquire than prescription medications.



▲ **FIGURE 1-65 SPATIAL ASSOCIATION: OPIOIDS** (a) Overdose deaths involving opioids; (b) opioid prescriptions per capita.
Source: Centers for Disease Control and Prevention

In the twenty-first century, drug overdose has become the leading cause of death of Americans under age 50. Two-thirds of overdose deaths are attributable to opioids, which in high doses over a long period can cause respiratory failure (Figure 1-65).

Figure 1-65a shows the distribution of overdose deaths related to opioids. Though most opioid-related deaths are in heavily populated urban areas, the highest per capita rates within the United States are in the Appalachians and the Southwest.

Figure 1-65b shows the distribution of prescriptions written for opioids. Prescription rates vary widely by state and county – three times higher in Alabama than in Hawaii, for example. The distribution of places with relatively high prescription rates is similar to the distribution of deaths from overdose. The two maps together show a strong spatial association between overdoses and prescriptions for opioids.

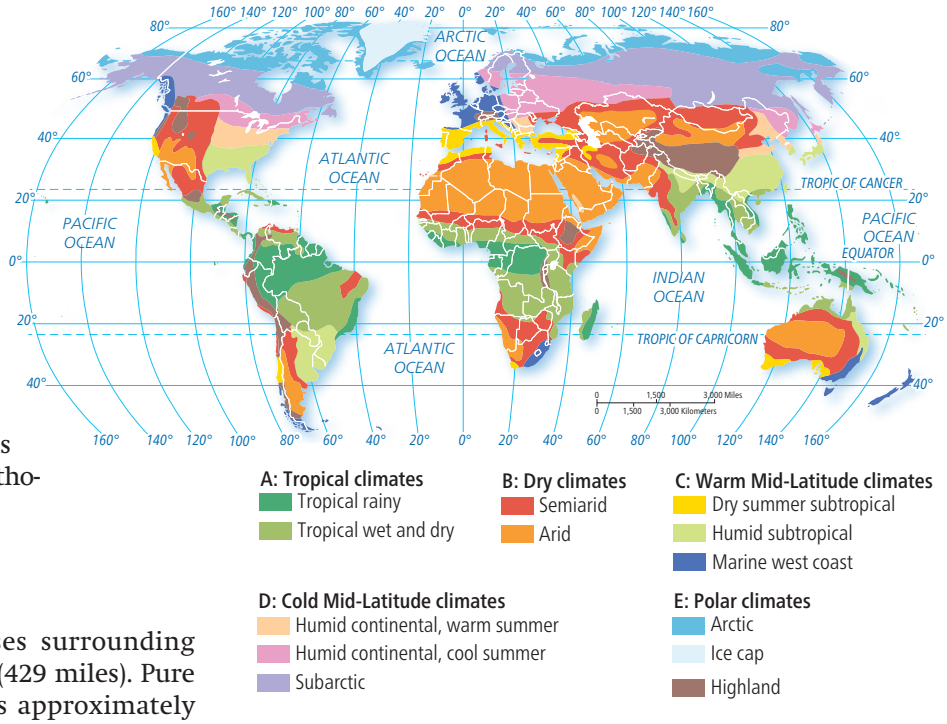
Health issues that cause people pain do not vary much from place to place and do not explain this variability in prescribing. So, the variation may be related to regional differences among doctors concerning how much pain medication to prescribe (Figure 1-66).

▲ **FIGURE 1-66 FIGHTING OPIOIDS** Naloxone is a medication used to block the effects of opioids. August 31 is International Overdose Awareness Day.

Sustainability & Earth Systems

Learning Outcome 1.4.3 Explain Earth's four physical systems.

Geographers classify natural resources as part of four interrelated systems. These four physical systems are classified as either biotic or abiotic. A **biotic** system is composed of living organisms. An **abiotic** system is composed of nonliving or inorganic matter. Three of Earth's four systems are abiotic: atmosphere, hydrosphere, and lithosphere. The biosphere is biotic.



▲ **FIGURE 1-67 CLIMATE REGIONS**

Atmosphere

The **atmosphere** is a thin layer of gases surrounding Earth, at an altitude up to 690 kilometers (429 miles). Pure dry air in the lower atmosphere contains approximately 78.08 percent nitrogen, 20.95 percent oxygen, 0.93 percent argon, 0.04 percent carbon dioxide, and trace amounts of a few other gases (measured by volume). As atmospheric gases are held to Earth by gravity, pressure is created. Variations in air pressure from one location to another are responsible for producing such weather features as wind blowing, storms brewing, and rain falling.

The long-term average weather condition at a particular location is **climate**. Geographers frequently classify climates according to a system developed by German climatologist Vladimir Köppen. The modified Köppen system divides the world into five main climate regions (Figure 1-67). Each region, in turn, is divided into two or three subregions.

Hydrosphere

The **hydrosphere** is composed of all the water on and near Earth's surface. Water exists in liquid form in the oceans, lakes, and rivers as well as groundwater in soil and rock. It can also exist as water vapor in the atmosphere and as ice in glaciers. Over 97 percent of the world's water is in the oceans. The oceans supply the atmosphere with water vapor, which returns to Earth's surface as precipitation, the most important source of fresh water.

Consumption of water is essential for the survival of plants and animals, and a large quantity and variety of plants and animals live in it. Because water gains and loses heat relatively slowly, it also moderates seasonal temperature extremes over much of Earth's surface.

The climate of a particular location influences human activities, especially production of the food needed to survive. People in parts of the tropical climate region (see Figure 1-67), especially southwestern India, Bangladesh, and the Myanmar coast, anxiously await the annual monsoon winds bringing rain, which is essential for successful agriculture and provides nearly 90 percent of India's water supply (Figure 1-68). For most of the year, the region receives dry, somewhat cool air from the northeast. In June, the wind direction suddenly shifts, bringing moist, warm, southwesterly air, known as the monsoon, from the Indian Ocean. The monsoon brings rain that lasts until September. In years when the rain is delayed or fails to arrive (23 times during the twentieth century) drought results, agricultural output falls, and famine threatens in the countries of South Asia, where nearly 25 percent of the world's people live. The seasonal rain is so important in India that the words for "year," "rain," and "rainy season" are identical in many local languages.

▼ **FIGURE 1-68 RAIN FROM MONSOON WINDS, KOLKATA, INDIA**

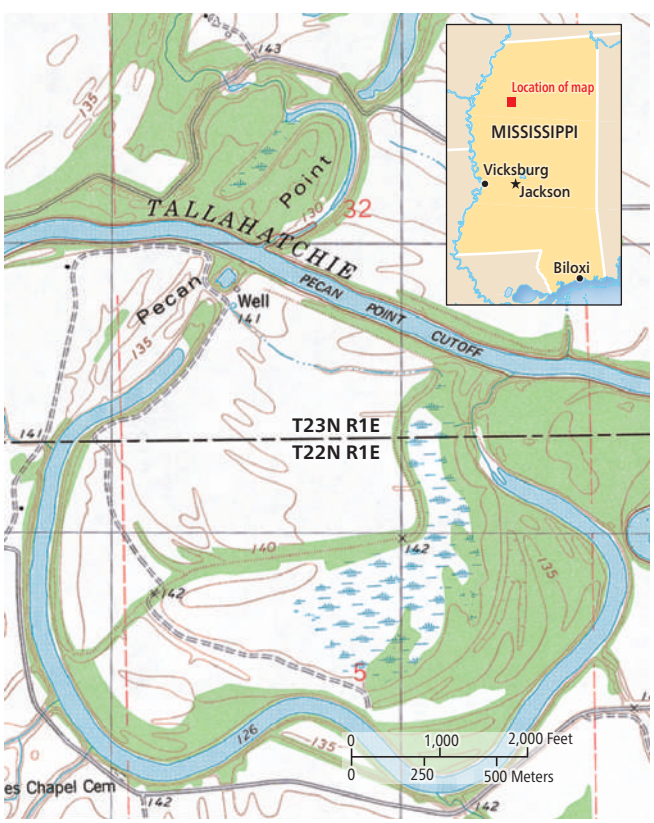
Pause & Reflect 1.4.3 How do the atmosphere and hydrosphere interact to produce South Asia's monsoon rains?

Lithosphere

Earth is composed of concentric spheres. The inner core is a dense, metallic sphere about 1,200 kilometers (760 miles) in radius. Surrounding the inner core is an outer core, about 2,400 kilometers (1,500 miles) thick, composed mostly of liquid iron and nickel. The next layer is the mantle about 2,900 kilometers (1,800 miles) thick. The outermost layer is the crust, a thin, brittle outer shell 5 to 70 kilometers (3 to 44 miles) thick. The **lithosphere** encompasses the crust and a portion of the mantle. Powerful forces deep within Earth bend and break the crust to form mountain chains and shape the crust to form continents and ocean basins.

Earth's surface features, or landforms, vary from relatively flat to mountainous. Geographers find that the study of Earth's landforms – a science known as geomorphology – helps to explain the distribution of people and the choice of economic activities at different locations. People prefer living on flatter land, which generally is better suited for agriculture. Great concentrations of people and activities in hilly areas may require extensive effort to modify the landscape.

Topographic maps, published for the United States by the U.S. Geological Survey (USGS), show details of physical features, such as bodies of water, forests, mountains, valleys, and wetlands. They also show cultural features, such as buildings, roads, parks, farms, and dams. "Topos" are used by engineers, hikers, hunters, people seeking home sites, and anyone who really wants to see the lay of the land (Figure 1-69). The brown lines in Figure 1-69 are contour lines that show the elevation of any location. Lines are further apart in flatter areas and closer together in hilly areas.



▲ **FIGURE 1-69 TOPOGRAPHIC MAP** A portion of a topographic map published by the U.S. Geological Survey shows physical features in northwestern Mississippi.

Biosphere

The **biosphere** encompasses all of Earth's living organisms. Because living organisms must exist through interaction with the surrounding physical environment, the biosphere also includes portions of the three abiotic systems near Earth's surface. Living organisms in the biosphere interact with each of the three abiotic systems. For example, a piece of soil may comprise mineral material from the lithosphere, moisture from the hydrosphere, pockets of air from the atmosphere, and plant and insect matter from the biosphere.

Most of the living organisms interact within the top 3 meters (10 feet) of the lithosphere, the top 200 meters (650 feet) of the hydrosphere, and the lowest 30 meters (100 feet) of the atmosphere. The lithosphere is where most plants and animals live and where they obtain food and shelter. The hydrosphere provides water to drink and physical support for aquatic life. The atmosphere provides the air for animals to breathe and protects them from the Sun's rays.

A group of living organisms and the abiotic spheres with which they interact is an **ecosystem** (Figure 1-70). The scientific study of ecosystems is **ecology**. Ecologists study interrelationships between living organisms and the three abiotic environments as well as interrelationships among the various living organisms in the biosphere. Human geographers are especially interested in ecosystems involving the interaction of humans with the rest of the biosphere and the three abiotic spheres.

▲ **FIGURE 1-70 ECOSYSTEM: WHITE CLIFFS OF DOVER, UNITED KINGDOM** The city of Dover, United Kingdom, sits atop a lithosphere of chalky cliffs, beside the hydrosphere of the English Channel, beneath the atmosphere above, and surrounded by a green biosphere. Geographers are especially interested in the ecosystem of a city because more than half of Earth's humans live in urban areas. The lithosphere provides the ground and the materials to erect homes and businesses. The hydrosphere provides the water for urban dwellers to consume. The atmosphere is where urban dwellers emit pollutants. Some plants and other animals of the biosphere thrive along with humans in the cities, whereas others struggle.

Sustainability & Resources

Learning Outcome 1.4.4 Describe the three pillars of sustainability.

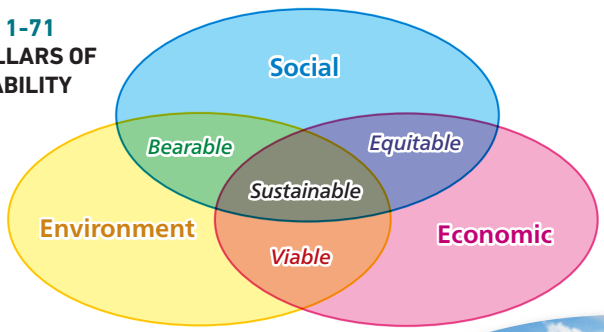
A **resource** is a substance in the environment that is useful to people, economically and technologically feasible to access, and socially acceptable to use. **Sustainability** is the use of Earth's resources in ways that ensure their availability in the future.

From the perspective of human geography, nature offers a large menu of resources available for people to use. A substance is merely part of nature until a society has a use for it. Water, minerals, soil, plants, and animals are all examples of resources.

Sustainability's Three Pillars

According to the United Nations, sustainability rests on three pillars: environment, economy, and society (Figure 1-71). The 1987 U.N. report *Our Common Future* is a landmark work in recognizing sustainability as a combination of natural and human elements. The report is frequently called the Brundtland Report, named for the chair of the World Commission on Environment and Development, Gro Harlem Brundtland, former prime minister of Norway.

FIGURE 1-71 THREE PILLARS OF SUSTAINABILITY



The Brundtland Report argues that sustainability can be achieved only by bringing together environmental protection, economic growth, and social equity. The report is optimistic about the possibility of promoting environmental protection at the same time as economic growth and social equity.

Environment Pillar. The sustainable use and management of natural resources to meet human needs such as food, medicine, and recreation is **conservation**. Resources such as trees are conserved if they are cut down at a slower rate than the time it takes for their replacement by new tree growth.

Economic Pillar. Natural resources acquire a monetary value through exchange in a marketplace. In a market economy, supply and demand are the principal factors determining affordability. The greater the supply, the lower the cost; the greater the demand, the higher the cost. However, geographers observe that some goods do not reflect their actual environmental costs. For example, motorists sitting in a traffic jam do not have to pay a fee for the relatively high level of pollution their vehicles emit.

Social Pillar. Humans need shelter, food, and clothing to survive, so they make use of resources to meet these needs. Consumer choices can support sustainability when people embrace sustainability as a value. For example, a consumer might prefer clothing made of sustainable resources such as cotton instead of clothing made of unsustainable resources such as polyester made from petroleum.

The three pillars can be illustrated in the Everglades (Figures 1-72, 1-73, and 1-74).

Pause & Reflect 1.4.4 What do you think might be the reaction of the farmers in Figure 1-74 to tourists such as those in Figure 1-72?

FIGURE 1-72 SOCIAL PILLAR Everglades National Park attracts 1 million visitors a year. The National Park Service tries to provide an enjoyable visit while protecting the area's fragile environment.

FIGURE 1-73 ENVIRONMENT PILLAR The Everglades was once a very wide and shallow freshwater river, slowly flowing south from Lake Okeechobee to the Gulf of Mexico. A sensitive environment of plants and animals once thrived in this distinctive landscape, but much of it was destroyed by human actions to promote the economy.

FIGURE 1-74 ECONOMIC PILLAR The U.S. Army Corps of Engineers built levees and canals in the Everglades. These modifications opened up land for growing sugarcane and protected the growing South Florida population from flooding. However, the modifications also had unintended consequences, including polluted water and threats to native vegetation and animals.

Climate Change Risks

The sustainable use of Earth's resources is threatened by climate change. Moody's Investors Services, a credit rating agency, has incorporated climate change threats into its research on bonds issued by commercial and government entities. Moody's ESG Solutions (formerly known as Four Twenty Seven) assists corporations and governments to assess the risks to climate change from their actions. Moody's focuses on six types of climate risks that can impact communities: flooding, heat stress, water stress (drought), wildfires, hurricanes, and sea level rise. Moody's ESG has identified which of the six are most threatening in every region of the world (Figure 1-75).

At the scale of individual country, Moody's ESG has determined an overall level of risk based on scores for each of the six climate impacts (Figure 1-76). The United States, Mexico, Brazil, China, and Indonesia are judged especially vulnerable.

FIGURE 1-75 SIX TYPES OF CLIMATE CHANGE RISKS

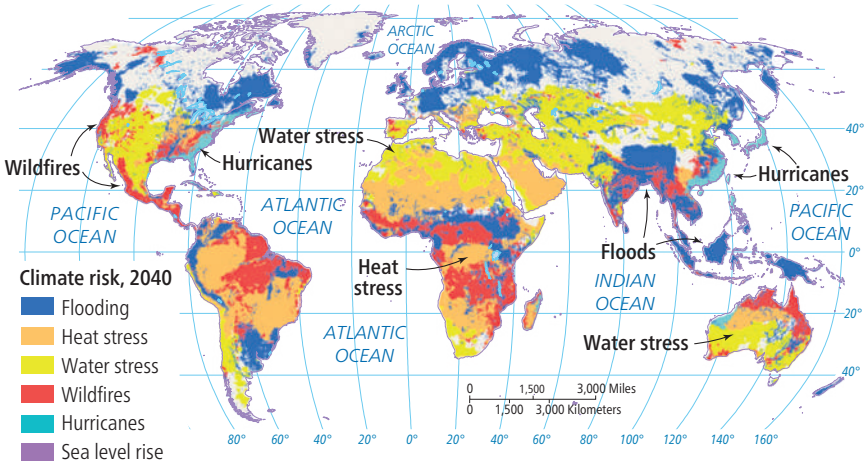
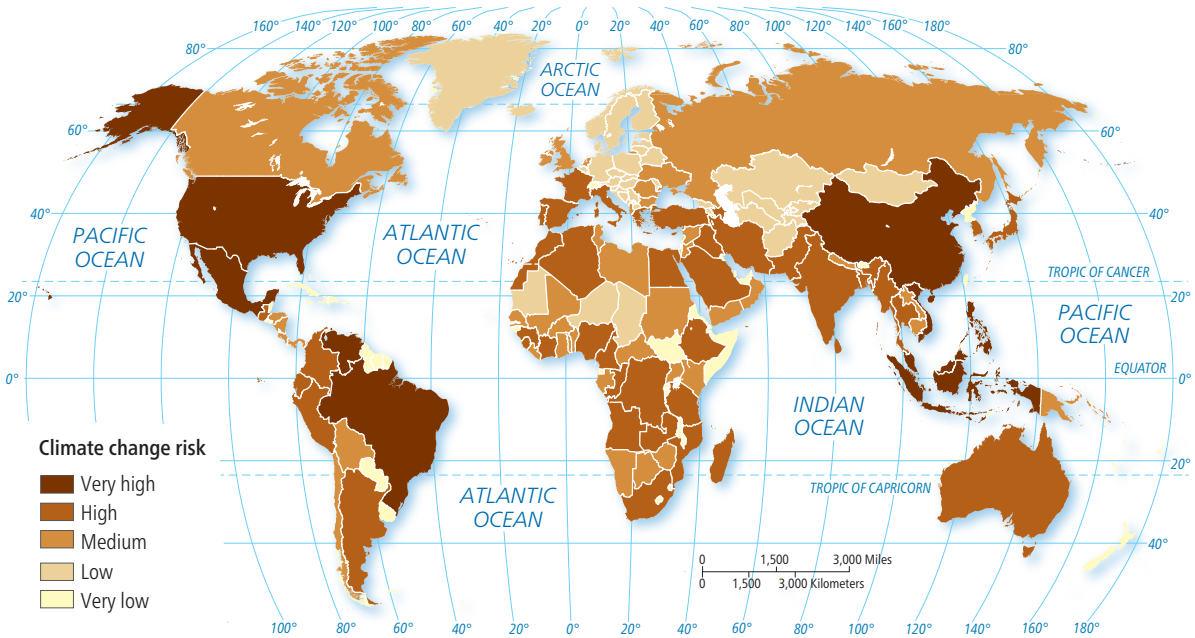


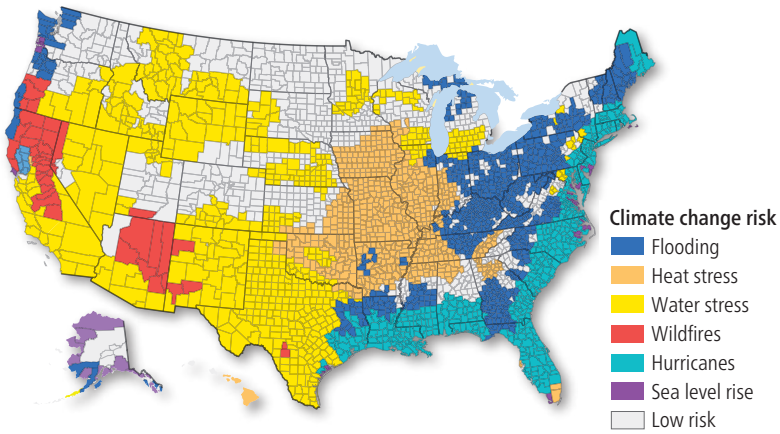
FIGURE 1-76 CLIMATE CHANGE SCORE



U.S. Climate Change Risks

Within the United States, the six types of climate change risks impact different regions (Figure 1-77). According to Moody's ESG research, 169 million Americans live in places that are at risk from water stress (drought, especially those living in the West), 104 million from hurricanes (especially those living along the Atlantic Ocean and Gulf of Mexico coasts), 94 million from extreme rainfall resulting in flooding (especially those living in the Northeast), 92 million from the stress of high heat (especially in the center of the country), 22 million from rising seas (especially near the Atlantic and Gulf of Mexico), and 7 million from wildfires (especially in the West).

FIGURE 1-77 U.S. CLIMATE CHANGE RISKS



Sustainable Ecosystems

Learning Outcome 1.4.5 Examine sustainable ecosystems in the Netherlands.

The Netherlands ecosystem is heavily dependent on human modification of the hydrosphere. Over several centuries, the Dutch modified their environment with two distinctive types of construction projects – polders and dikes (Figure 1-78). At this time, the ecological modifications in the Netherlands appear sustainable.

Polders

A **polder** is a piece of land that is created by draining water from an area. The Netherlands has 6,500 square kilometers (2,600 square miles) of polders, comprising 16 percent of the country's land area.

Polders, first created in the thirteenth century, were constructed primarily by private developers in the sixteenth and seventeenth centuries and by the government during the past 200 years. The Dutch government has reserved most of the polders for agriculture to reduce the country's dependence on imported food. Some of the polders are used for housing, and one contains Schiphol Airport (Figure 1-79).

▲ **FIGURE 1-79 DUTCH POLDER** Schiphol Airport is built on a polder.

▲ **FIGURE 1-80 DUTCH DIKE** The Delta Works dikes are built to close off the Rhine, Meuse, and Schelde Rivers from the North Sea.

Dikes

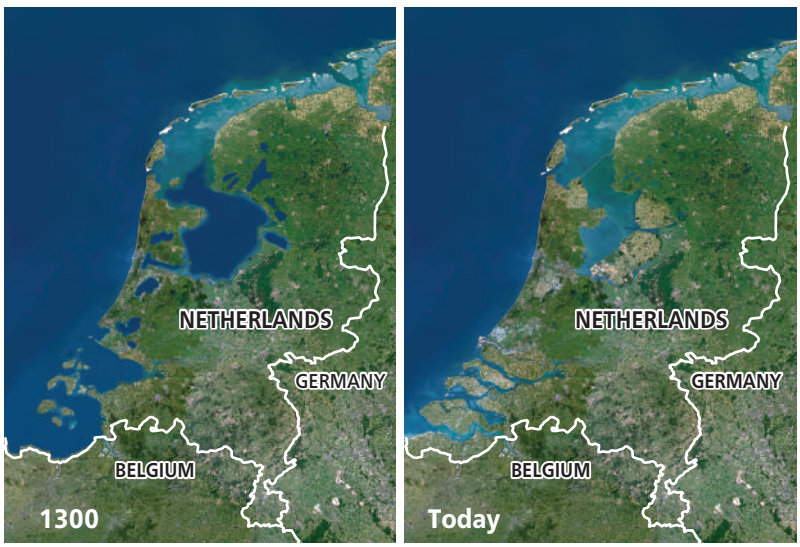
The second distinctive modification of the landscape in the Netherlands is the construction of massive dikes to prevent the North Sea, an arm of the Atlantic Ocean, from flooding much of the country. The Dutch have built dikes in two major locations – the Zuider Zee project in the north and the Delta Works project in the southwest.

The Zuider Zee, a shallow bay of the North Sea, once threatened the heart of the Netherlands with flooding. A dike completed in 1932 caused the Zuider Zee to be converted from a saltwater sea to a freshwater lake called IJsselmeer. Some of the lake has been drained to create several polders.

A second ambitious project in the Netherlands is the Delta Works (Figure 1-80). Several rivers that flow through the Netherlands to the North Sea split into many branches and form a low-lying delta that is vulnerable to flooding. After a devastating flood in January 1953 killed 1,836 people, the Delta Works called for the construction of several dams to close off most of the waterways.

Once these two massive projects were finished, attitudes toward modifying the environment changed. To preserve the IJsselmeer's recreation value, the Dutch scrapped plans to build more polders. The Dutch are deliberately breaking some of the dikes to flood fields. A plan adopted in 1990 called for returning 263,000 hectares (650,000 acres) of farms to wetlands or forests.

Global warming could threaten the Netherlands by raising the level of the sea around the country by between 20 and 58 centimeters (8 and 23 inches) within the next 100 years. Rather than build new dikes and polders, the Dutch are focusing on reducing the causes of global warming by acting to reduce industrial pollution and increase solar and wind power use, among other actions. In fact, the Dutch are world leaders in mitigating the effects of global warming.



▲ **FIGURE 1-78 SUSTAINABLE WATER MANAGEMENT: THE NETHERLANDS** The Dutch have considerably altered the site of the Netherlands through creation of polders and dikes.

Pause & Reflect 1.4.5 How might creating new wetlands and lakes rather than dikes or polders help the Netherlands cope with sea-level rise due to climate change?

Cultural Ecology

The geographic study of human–environment relationships is known as **cultural ecology**. The roots of cultural ecology reach back more than 200 years, to an era when early scientists traveled the globe, observing how people lived in different environments.

Environmental Determinism. Pioneering nineteenth-century German geographers Alexander von Humboldt (1769–1859) and Carl Ritter (1779–1859) believed that the physical environment caused social development, an approach called **environmental determinism**. According to Humboldt and Ritter, human geographers should apply laws from the natural sciences to understanding relationships between the physical environment and human actions. They argued that the scientific study of social and natural processes is fundamentally the same.

Other influential geographers adopted environmental determinism in the late nineteenth and early twentieth centuries. Friedrich Ratzel (1844–1904) and his American student Ellen Churchill Semple (1863–1932) claimed that geography was the study of the influences of the natural environment on people.

Another early American geographer, Ellsworth Huntington (1876–1947), argued that climate was a major determinant of civilization. For instance, according to Huntington, the temperate climate of maritime northwestern Europe produced greater human efficiency as measured by better health conditions, lower death rates, and higher standards of living.

Possibilism. To explain relationships between human activities and the physical environment, modern geographers reject environmental determinism in favor of possibilism. According to **possibilism**, the physical environment may limit some human actions, but people have the ability to adjust to their environment. People can choose a course of action from many alternatives in the physical environment.

The climate of any location influences human activities, especially food production. From one generation to the next, people learn that different crops thrive in different climates. For example, rice requires plentiful water, whereas wheat survives on limited moisture and actually grows poorly in very wet environments. On the other hand, wheat is more likely than rice to be grown successfully in colder climates. Thus, according to possibilism, people can choose the crops they grow and yet be compatible with their environment.

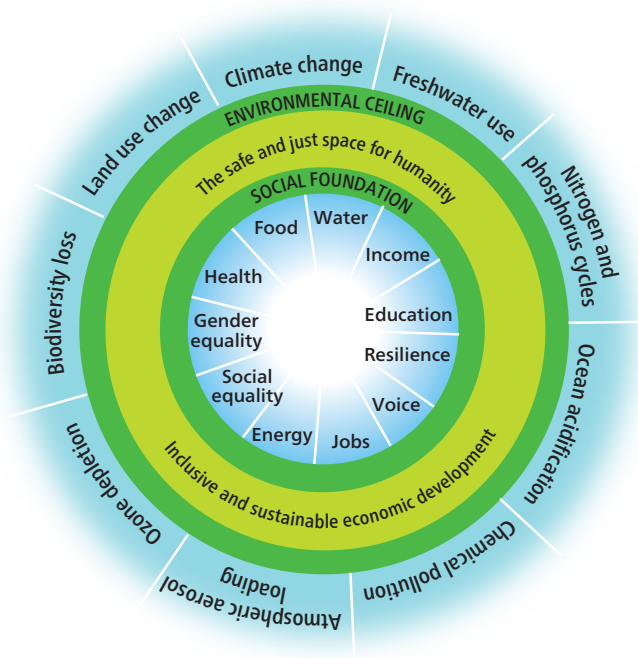
Some human impacts on the environment are based on deep-seated cultural values. Why do we plant our front yard with grass, water it to make it grow, mow it to keep it from growing tall, and impose fines on those who fail to mow often enough? Why not let dandelions or wildflowers grow instead? Why does one group of people consume the fruit from deciduous trees and chop down the conifers for building materials, whereas another group chops down the deciduous trees for furniture while preserving the conifers as religious symbols? Are some of these actions more sustainable than others? **Political ecology** is an approach to sustainability that focuses on how politics and economic power shape the ability to manage resources.

A Sustainability Doughnut

To plan for a more sustainable future, the city of Amsterdam has adopted a model known as doughnut economics (Figure 1-81). The doughnut, developed by British economist Kate Raworth, depicts the sustainability model as two concentric rings. The inner ring shows what people need to lead a decent life, such as food, clean water, jobs, and education. People who don't have these necessities of life are falling through the doughnut's center hole.

The lines radiating out from the center represent the use of various resources; the further from the center, the less sustainable is the use of a resource. The outer ring of the doughnut represents ecological boundaries set by scientists. These are the boundaries that people should not cross because to do so would damage Earth's ecosystems, resulting in more pollution, biodiversity loss, and climate change.

For example, to address its need for more affordable housing for its residents, Amsterdam could choose to simply build more houses. But the city's sustainability model suggests that meeting the need for affordable housing this way is not sustainable. For example, most building materials would have to be imported, utilizing a lot of energy. Instead, Amsterdam is requiring builders to maximize their use of recycled materials and to minimize their use of plastics and imported materials.



▲ **FIGURE 1-81 SUSTAINABILITY DOUGHNUT MODEL** Meeting human needs (shown in the inner ring) can be achieved within the environment's constraints (shown in the outer ring).

1 Summary & Review

KEY ISSUE

1.1 | Why Is Geography a Science?

- Geography has ancient and medieval roots.
- Maps are tools of reference and increasingly tools of communication.
- Contemporary mapping utilizes electronic technologies, such as GPS and GIS.
- Reading a map requires recognizing its scale and projection.

KEY ISSUE

1.2 | Why Is Every Place Unique?

- Location is identified through toponym (name), site, and situation.
- Regions can be formal, functional, or vernacular.
- Culture encompasses what people care about and what people take care of.

KEY ISSUE

1.3 | Why Are Different Places Similar?

- Geographers examine at several scales, though they are increasingly concerned with the global scale.
- The three properties of distribution are density, concentration, and pattern.
- Different cultural groups display distinctive distributions in space.
- In spite of space–time compression, peripheral regions in the global economy often have unequal access to the goods and services available in core regions.

KEY ISSUE

1.4 | Why Are Different Places Connected?

- Places are connected through networks, and phenomena spread through relocation and expansion diffusion.
- Sustainability combines environment, economy, and society.
- Earth's resources encompass the abiotic systems of the atmosphere, the hydrosphere, and the lithosphere and the biotic system of the biosphere.
- Ecology is the study of living organisms and the abiotic spheres with which they interact.
- Ecosystems may or may not be sustainable.

Key Terms

Abiotic Composed of nonliving or inorganic matter.

Absolute location Description of the position of a place in a way that never changes, such as geographic coordinates of latitude and longitude.

Acculturation The process of changes in culture that result from the meeting of two groups, each of which retains distinct cultural features.

Assimilation The process by which a group's cultural features are altered to resemble those of another group.

Atmosphere The thin layer of gases surrounding Earth.

Behavioral geography An approach to human geography that emphasizes the importance of understanding the psychological basis for individual human actions in space.

Biosphere All living organisms on Earth, including plants and animals, as well as microorganisms.

Biotic Composed of living organisms.

Cartogram A map in which the size of an area is proportional to the value of the variable.

Cartography The science of making maps.

Choropleth map A map in which areas are shaded or patterned in proportion to the measurement of the variable.

Citizen science Scientific research by amateur scientists.

Climate The long-term average weather condition at a particular location.

Concentration The extent of a feature's spread over a given area.

Connection The relationships among people and objects across the barrier of space.

Conservation The sustainable management of a natural resource to meet human needs.

Contagious diffusion The rapid, widespread diffusion of a feature or trend throughout a population.

Coordinated Universal Time (UTC) Informally Greenwich Mean Time (GMT). The time in the zone encompassing the prime meridian, or 0° longitude.

Cultural ecology A geographic approach that emphasizes human-environment relationships.

Cultural landscape An approach to geography that emphasizes the relationships among social and physical phenomena in a particular study area.

Culture The body of material possessions, customary beliefs, and social norms that together constitutes the distinct tradition of a group of people.

Density The frequency with which something exists within a given unit of area.

Diffusion The process by which a feature spreads from one place to another over time.

Distance decay The diminished importance and eventual disappearance of a phenomenon with increasing distance from its origin.

Distribution The arrangement of something across Earth's surface.

Dot distribution map A map that depicts data that consists of discrete observations. Each dot represents a predetermined number of observations, which could be one or many.

Ecology The scientific study of ecosystems.

Ecosystem A group of living organisms and the abiotic spheres with which they interact.

Environmental determinism A nineteenth- and early twentieth-century approach to the study of geography that argued that the general laws sought by human geographers could be found in the physical sciences. Geography was therefore the study of how the physical environment caused human activities.

Expansion diffusion The spread of a feature or trend among people from one area to another in an additive process.

Formal region (or **uniform region)** An area in which everyone shares in at least one distinctive characteristic.

Functional region (or **nodal region)** An area organized around a node or focal point.

Geographic information science (GIScience) Analysis of data about Earth acquired through satellite and other electronic information technologies.

Geographic information system (GIS) A computer system that captures, stores, queries, and displays geographic data.

Geotagging Identification and storage of a piece of information by its precise latitude and longitude coordinates.

Global Positioning System (GPS) A system that determines the precise position of something on Earth through a series of satellites, tracking stations, and receivers.

Globalization Actions or processes that involve the entire world and result in making something worldwide in scope.

Graduated symbol map A map that displays symbols that change in size according to the value of the variable.

Hearth A place from which an innovation originates.

Hierarchical diffusion The spread of a feature or trend from one key person or node of authority or power to other persons or places.

Humanistic geography An approach to human geography that emphasizes the different ways that individuals form ideas about place and give those places symbolic meanings.

Hydrosphere All of the water on and near Earth's surface.

International Date Line An arc that for the most part follows 180° longitude. When the International Date Line is crossed heading east (toward America), the clock moves back 24 hours, or one entire day. When it is crossed heading west (toward Asia), the calendar moves ahead one day.

Isoline map A map that connects places of a particular value by lines.

Latitude The numbering system used to indicate the location of parallels drawn on a globe and measuring distance north and south of the equator (0°).

Lithosphere Earth's crust and a portion of upper mantle directly below the crust.

Location The position of anything on Earth's surface.

Longitude The numbering system used to indicate the location of meridians drawn on a globe and measuring distance east and west of the prime meridian (0°).

Map A two-dimensional, or flat, representation of Earth's surface or a portion of it.

Map scale The relationship between the size of an object on a map and the size of the actual feature on Earth's surface.

Mashup A map that overlays data from one source on top of a map provided by a mapping service.

Meme Contagious diffusion through the internet or social media.

Mental map A representation of a portion of Earth's surface based on what an individual knows about a place that contains personal impressions of what is in the place and where the place is located.

Meridian An arc drawn on a map between the North and South poles.

Network A chain of communication that connects places.

Parallel A circle drawn around the globe parallel to the equator and at right angles to the meridians.

Participatory GIS (PGIS) Community-based mapping, representing local knowledge and information.

Pattern The geometric or regular arrangement of something in a particular area.

Photogrammetry The science of taking measurements of Earth's surface from photographs.

Place A specific point on Earth, distinguished by a particular characteristic.

Polder Land that is created by draining water from an area.

Political ecology An approach to sustainability that focuses on how politics and economic power shape the ability to manage resources.

Possibilism The theory that the physical environment may set limits on human actions, but people have the ability to adjust to the physical environment and choose a course of action from many alternatives.

Post-structuralist geography Geographic approach that examines how the powerful in a society dominate, or seek to control, less powerful groups, how the dominated groups occupy space, and confrontations that result from the domination.

Prime meridian The meridian, designated as 0° longitude, that passes through the Royal Observatory at Greenwich, England.

Projection A system used to transfer locations from Earth's surface to a flat map.

Region An area distinguished by one or more distinctive characteristics.

Relocation diffusion The spread of a feature or trend through physical movement of people from one place to another.

Remote sensing The acquisition of data about Earth's surface from a satellite orbiting the planet or from other long-distance methods.

Resource A substance in the environment that is useful to people, is economically and technologically feasible to access, and is socially acceptable to use.

Scale The relationship between the portion of Earth being studied and Earth as a whole.

Site The physical character of a place.

Situation (or **relative location)** The location of a place relative to another place.

Social construction An idea or a meaning that is widely accepted as natural by a society but may not represent a reality shared by those outside the society.

Space The physical gap or interval between two objects.

Space–time compression The reduction in the time it takes to diffuse something to a distant place as a result of improved communications and transportation systems.

Spatial association The relationship between the distribution of one feature and the distribution of another feature.

Stimulus diffusion The spread of an underlying principle.

Sustainability The use of Earth's renewable and nonrenewable natural resources in ways that do not constrain resource use in the future.

Syncretism The combining of elements of two groups into a new cultural feature.

Toponym The name given to a portion of Earth's surface.

Transnational corporation A company that conducts research, operates factories, and sells products in many countries, not just where its headquarters or shareholders are located.

Uneven development The increasing gap in economic conditions between core and peripheral regions as a result of the globalization of the economy.

Vernacular region (or **perceptual region)** An area that people believe exists as part of their cultural identity.

Volunteered geographic information (VGI) Creation and dissemination of geographic data contributed voluntarily and for free by individuals.

Thinking Geographically

KEY ISSUE

1.1 | Why Is Geography a Science?

Geography plays an important role on our electronic devices. What was the most recent geographic item that you consulted on your electronic device? Describe how this item illustrated each of geography's five basic concepts of place, region, scale, space, and connection.

▲ FIGURE 1CR-1 GPS MAPPING AND TRACKING APP

KEY ISSUE

1.2 | Why Is Every Place Unique?

The South and the West are commonly cited vernacular regions in the United States. What are some of the features you would expect to distinguish these regions?

▲ FIGURE 1CR-2 BIG SUR, CALIFORNIA

KEY ISSUE

1.3 | Why Are Different Places Similar?

Describe elements of your daily life that derive from the globalization economy and culture and ways in which your actions and behavior represent distinctive displays of local diversity.

▲ FIGURE 1CR-3 TOUCHSCREEN ORDERING, MCDONALD'S SINGAPORE

KEY ISSUE

1.4 | Why Are Different Places Connected?

How did your connections with other places change as a result of the COVID-19 pandemic? Can you identify a change in connections with other places that has been long-term or permanent since the onset of the pandemic? What might account for that permanent change in connections?

▲ FIGURE 1CR-4 VISITING GRANDMA DURING COVID-19 PANDEMIC

International Geographic Mapping Explorations

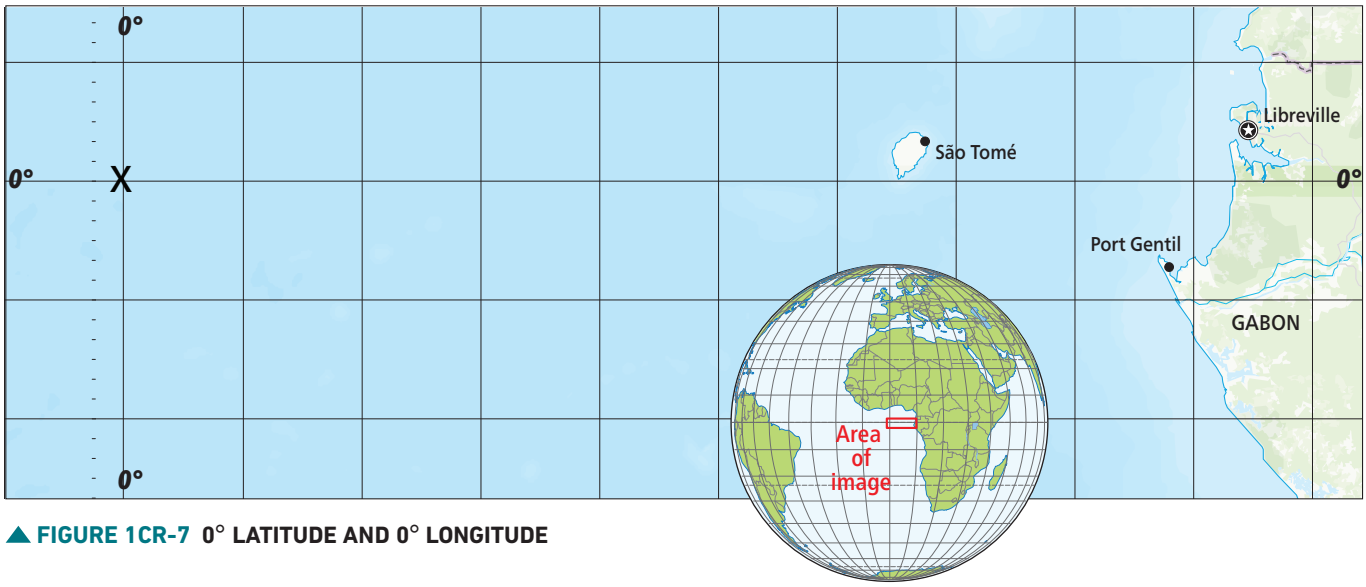
Latitude & Longitude

Measuring latitude and longitude is a great example of how geography is both a natural science and a study of human behavior. Latitudes are scientifically derived by Earth's shape and its rotation around the Sun. The Equator is 0° latitude. On the other hand, measuring longitude is a human creation. By international agreement, 0° longitude runs through the Royal Observatory, Greenwich, England (Figure 1CR-5). The Prime Meridian is depicted in the pavement outside the Royal Observatory (Figure 1CR-6).

It is not possible to stand at the one place on Earth where 0° latitude and 0° longitude intersect (except by boat). The point is located in the Atlantic Ocean, around 700 kilometers (450 miles) west of the Island country of São Tomé & Príncipe and 600 kilometers (400 miles) south of Ghana on the African mainland (Figure 1CR-7).

▲ FIGURE 1CR-5 ROYAL OBSERVATORY, GREENWICH, UNITED KINGDOM, AERIAL VIEW

▲ **FIGURE 1CR-6** **ROYAL OBSERVATORY PRIME MERIDIAN**



▲ **FIGURE 1CR-7** **0° LATITUDE AND 0° LONGITUDE**

. . . . Geographers apply five basic concepts (place, region, scale, space, and connection) to understand where people and activities found on Earth, and why they are there. The world's 8 billion people occupy Earth's surface in specific places and regions, while connected with each other in discernible patterns, as we see in the next chapter. . . .

2 Population & Health

KEY ISSUES

2.1 Where Are People Distributed?

People are not distributed uniformly across Earth. Rather, they are highly clustered in particular places, and they sparsely inhabit other places.

2.2 Why Is Population Increasing?

The human population is growing at different rates in different regions. Every society in the world is at some stage of population change in a process known as the *demographic transition*.

2.3 Why Does Health Vary by Region?

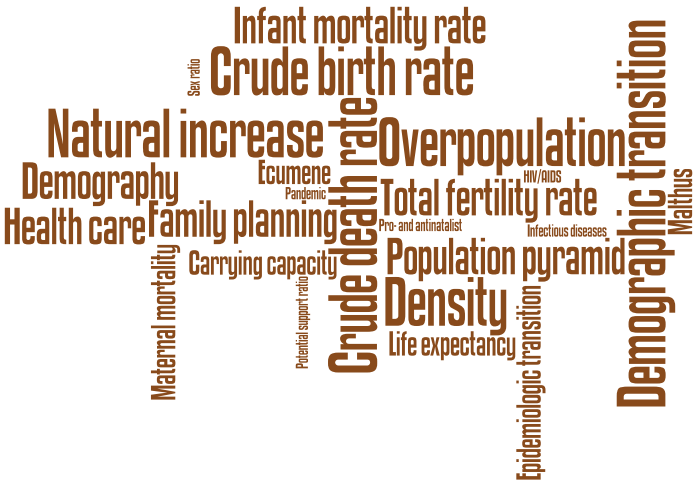
Patterns of health and provision of medical care vary across space. Health and medical care have improved in the world as a whole, but at the local scale, some people lack access to health care or are at increased risk of losing health-care access.

2.4 Why Might Population Change in the Future?

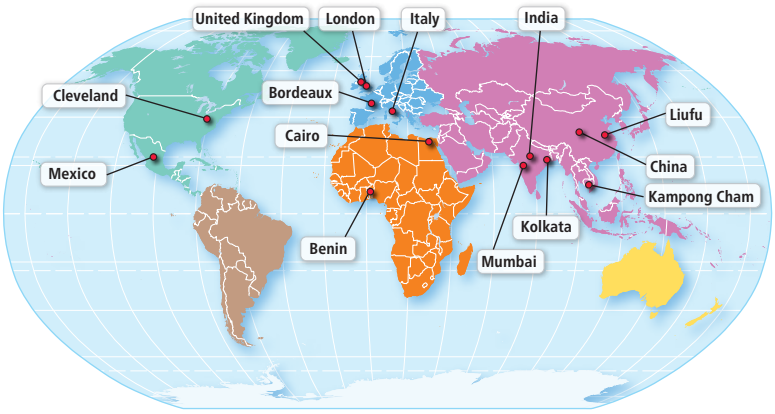
Geographers document strong connections between the size and growth of population and the adequacy of resources to meet the needs of people. Geographers find that overpopulation may be causing unprecedented resource consumption in some regions of the world.

▶ Awaiting COVID-19 test, United Kingdom.

More people are alive at this time than at any other point in Earth's history, and most of the growth is concentrated in developing countries. Can Earth sustain around 8 billion people now, let alone the added billions in the future? Geographers have unique perspectives on the ability of people to live on Earth under a wide range of different and ever-changing conditions. Already, the COVID-19 pandemic that began in 2019 has had a major impact on the population of the world.



LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

2.1 | Where Are People Distributed?

Geographers study population by first describing where Earth's 8 billion people are distributed and then turn to explaining why population is growing at different rates in different places. With the rate of world population growth slowing in the twenty-first century, geographers are increasingly interested in how the health of people in different places and the medical care available to them affect birth and death rates.

Population, Health, & Geography

Learning Outcome 2.1.1 Describe the distribution of the world's population.

The study of population geography is especially important for three reasons:

- Eight billion people are alive at this time, which is more than at any other point in Earth's long history.
- Virtually all global population growth is concentrated in developing countries (Figure 2-1).

▲ **FIGURE 2-1 INDIA: NOW SURPASSING CHINA AS THE WORLD'S MOST POPULOUS COUNTRY** People wait for a bus, Mumbai, India.

- The world's population increased at a faster rate during the second half of the twentieth century than ever before in history; the rate has slowed in the twenty-first century but is still high by historical standards.

The scientific study of population characteristics is **demography**. Demographers look at demographic variables, which explain statistically how people are distributed spatially by age, gender, occupation, fertility, health, and so on. Geographers are part of the team at organizations such as the Population Reference Bureau, the U.S. Bureau of the Census, and the United Nations Population Division that conduct demographic studies.

Demographers can tell us with some precision the historic and current population of the world and that of particular places. Forecasting the future population is much more challenging, but societies need these estimates in order to plan for the future.

Population & Resources

Geographers are interested in the relationship between population and the consumption of Earth's resources. **Carrying capacity** is the maximum population size of a species that the environment can sustain indefinitely, given the available resources such as food and water. The capacity of the land, seas, and atmosphere to sustain human life derives partly from characteristics of the natural environment and partly from human actions to modify the environment through agriculture, industry, and exploitation of raw materials. **Overpopulation** occurs when the number of people exceeds the capacity of the environment to support life at a decent standard of living.

From the perspective of globalization, some geographers argue that the world is already overburdened with too many people or it will be in the near future. At the scale of local diversity, geographers find that overpopulation is a threat in some regions of the world but not in others. The carrying capacity of Earth as a whole to support human life may be high, but only some regions exhibit a favorable balance between people and available resources (Figure 2-2).

Further, the regions with the most people are not the same as the regions with an unfavorable balance between population and resources.

▼ **FIGURE 2-2 THE CHALLENGE OF BALANCING PEOPLE AND RESOURCES** People living in parts of Benin have no running water at home, so they obtain water from a community water pump.

Population Portions

The world can be divided into seven population portions, each containing more than 1 billion people (Figure 2-3). The combined population portion of North America, Latin America, the South Pacific, and Greenland (an area of 53 million square kilometers) is about the same as the population portion of southern India (3 million square kilometers) or eastern China (5 million square kilometers). The small size of the Asia population portions shows the large number of the world's inhabitants living there compared with the population portion made up of North and South America, Australia, and New Zealand.

Population Cartogram

Population can also be displayed on a cartogram, which depicts the sizes of countries according to population rather than land area (Figure 2-4). When compared to a more typical land map of the world, the world cartogram represents areas with larger populations by larger depictions. As you look at different types of maps in this and subsequent chapters, pay special attention to Asia and Europe because environmental, economic, social, and other global patterns are heavily influenced by conditions in these two regions, where two-thirds of the world's people live.

Pause & Reflect 2.1.1 What challenges for sustaining human populations arise from Earth's carrying capacity?

FIGURE 2-3 WORLD POPULATION PORTIONS Each of the seven portions indicated by color in this figure contains slightly more than 1 billion inhabitants.

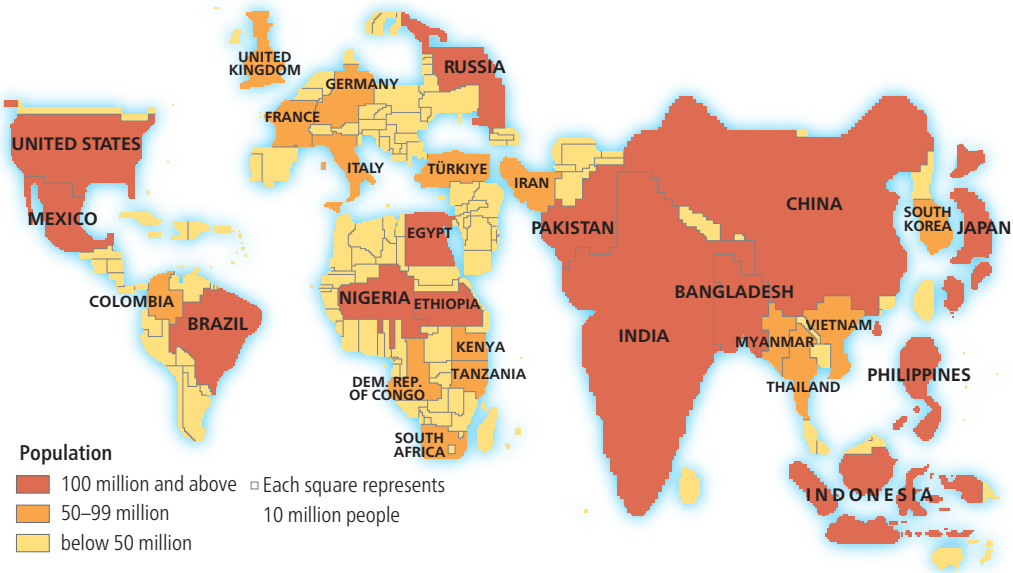


FIGURE 2-4 WORLD CARTOGRAM In a cartogram, countries are displayed by size of population rather than land area. For example, Canada is the world's second-largest country in land area, so it appears quite large on most maps. But it ranks only 38th in population so it appears small on this map. Conversely, Bangladesh ranks only 88th in land area but is 8th in population so appears large on the cartogram. Countries with populations over 50 million are labeled.

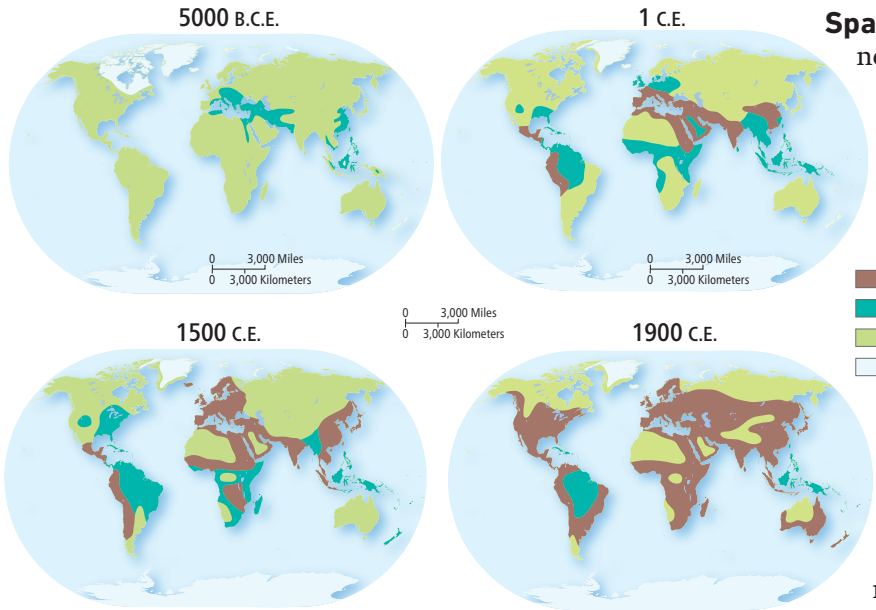
High & Low Population Concentrations

Learning Outcome 2.1.2 Contrast regions of high and low population concentrations.

Ecumene

The areas of Earth that humans consider too harsh for occupancy have diminished over time, whereas the portion of Earth's surface occupied by permanent human settlement—called the **ecumene**—has increased (Figure 2-5). By 7,000 years ago, humans had occupied most of Earth's land (except Antarctica), but permanent settlements existed primarily in Southwest Asia, Eastern Europe, and East Asia. Even 500 years ago much of North America and Asia lay outside the ecumene. Still, approximately three-fourths of the world's population lives on only 5 percent of Earth's surface. The balance of Earth's surface consists of oceans (about 71 percent) and less intensively inhabited land.

Pause & Reflect 2.1.2 Why are some land areas not part of the ecumene?



▲ **FIGURE 2-5 ECUMENE** The portion of Earth's surface occupied by permanent human settlement has increased.

Sparsely Settled Areas

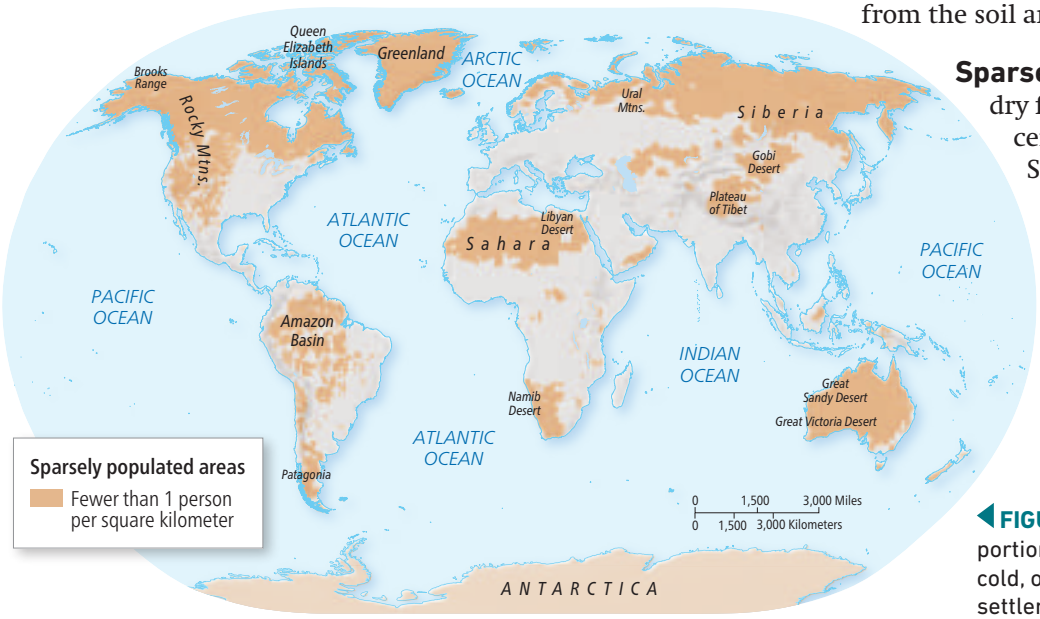
Human beings are not distributed uniformly across Earth. Geographers identify regions of Earth's surface where population is clustered and regions where it is sparse. Human beings avoid clustering in certain physical environments (Figure 2-6). Relatively few people live in regions that are too dry, too wet, too cold, or too mountainous for agriculture.

Sparsely Populated Cold Lands. Much of the land near the North Pole and South Pole is perpetually covered with ice or the ground is permanently frozen (permafrost). The polar regions are unsuitable for planting crops, few animals can survive the extreme cold, and few humans live there.

Sparsely Populated Mountainous Lands. The highest mountains in the world, such as the Tibet Plateau, are steep, snow covered, and sparsely settled. However, some high-altitude plateaus and mountain regions are more densely populated, especially at low latitudes (near the equator) where agriculture is possible at high elevations.

Sparsely Populated Wet Lands. Lands that receive very high levels of precipitation, located primarily near the equator, such as the Amazon Basin, may also be inhospitable for intensive human occupation. The combination of rain and heat rapidly depletes nutrients from the soil and thus hinders agriculture.

Sparsely Populated Dry Lands. Areas too dry for farming cover approximately 20 percent of Earth's land surface, including the Sahara and Gobi deserts. Deserts generally lack sufficient water to grow crops that could feed a large population, although some people survive there by raising animals, such as camels, that are adapted to the climate. Dry lands, however, contain natural resources useful to people—notably, much of the world's petroleum reserves.



◀ **FIGURE 2-6 SPARSELY SETTLED AREAS** Some portions of Earth are considered too wet, dry, cold, or mountainous to support intensive human settlement.

Population Concentrations

Two-thirds of the world's inhabitants are clustered in four regions: East Asia, South Asia, Europe, and Southeast Asia (Figure 2-7). In addition to the world's four most populous clusters, Africa has several concentrations. The two largest are along the west coast between Senegal and Nigeria and along the east coast between Eritrea and South Africa. The largest population concentration in the Western Hemisphere is in the northeastern United States and southeastern Canada.

The Four Population Clusters

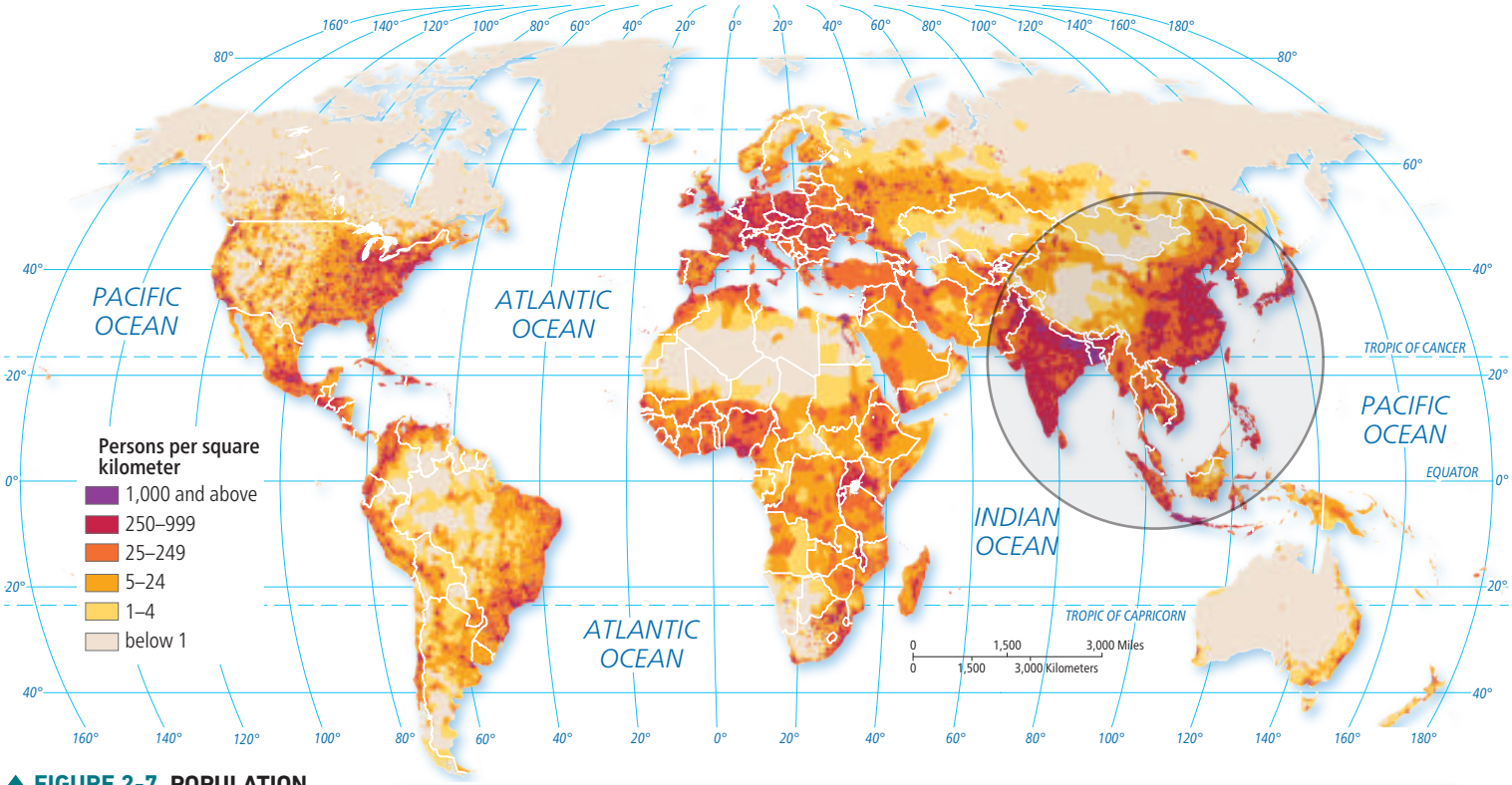
The four population clusters occupy generally low-lying areas, with fertile soil and temperate climate. Most people live near the ocean or near a river with easy access to an ocean rather than in the interior of major landmasses.

Europe Cluster. Europe includes four dozen countries, ranging from Monaco, with 2 square kilometers (0.8 square miles) and a population of 39,000, to Russia, the world's largest country in land area. The highest population concentrations in Europe are near the major rivers of Germany and Belgium as well as capital cities such as London and Paris.

East Asia Cluster. China has been the world's most populous country for several thousand years. China is the fourth-largest country in land area, but much of China's interior is sparsely inhabited mountains and deserts. The Chinese population is clustered near the Pacific Coast and in several fertile river valleys that extend inland.

South Asia Cluster. The largest concentration of people within South Asia lives along a 1,500-kilometer (900-mile) corridor from Lahore, Pakistan, through India and Bangladesh to the Bay of Bengal (Figure 2-8). Much of this area's population is concentrated along the plains of the Indus and Ganges rivers. Population is also heavily concentrated near India's two long coastlines – the Arabian Sea to the west and Bay of Bengal to the east.

Southeast Asia Cluster. Indonesia, which consists of 17,508 islands according to the Indonesian government, is the world's fourth-most-populous country. The largest population concentration is on the island of Java, inhabited by around 150 million people. Several islands that belong to the Philippines contain high population concentrations, and population is also clustered along several river valleys and deltas of the Southeast Asian mainland.



▲ **FIGURE 2-7 POPULATION CONCENTRATIONS** Half of the world's population live inside the circle.

▶ **FIGURE 2-8 SOUTH ASIA CLUSTER** Traffic congestion in New Delhi, the capital of India.

Population Density

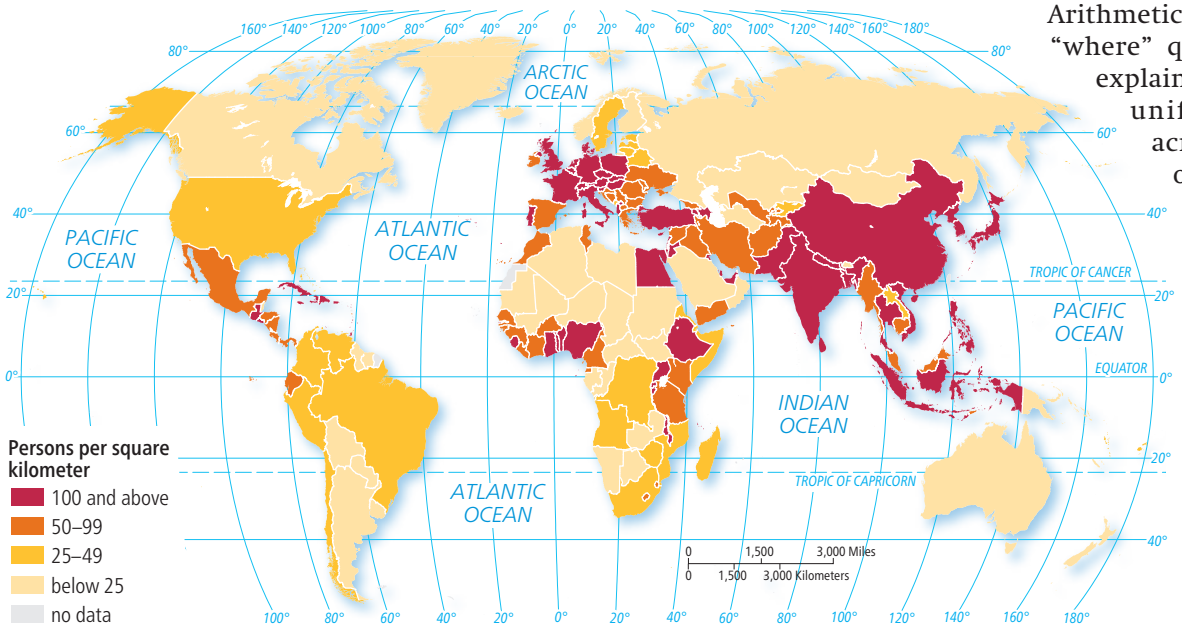
Learning Outcome 2.1.3 Compare different approaches to measuring density.

Density was defined in Chapter 1 as the frequency with which something exists within a given unit of area. Population density is the number of humans living within an area. The following are three measures of population density frequently used by geographers.

Arithmetic Density

Geographers most frequently use **arithmetic density**, which is the total number of objects in an area (Figure 2-9). In population geography, arithmetic density refers to the total number of people divided by total land area. For example, the arithmetic density of the United States is 34 persons per square kilometer. To compute the arithmetic density, divide the population by the land area. Arithmetic density enables geographers to compare the number of people living in different regions of the world.

Arithmetic density answers the "where" question. However, to explain why people are not uniformly distributed across Earth's surface, other density measures are more useful. For example, one could measure the number of housing units per area (Figure 2-10). Table 2-1 shows several examples of density measures.



▲ **FIGURE 2-9 ARITHMETIC DENSITY** Geographers rely on arithmetic density to compare conditions in different countries because the two pieces of information—total population and total land area—are easy to obtain.

▶ **FIGURE 2-10 HOUSING DENSITY** Cairo, Egypt.

TABLE 2-1 | Density Measures for Four Countries

Measure/Country	Canada	Egypt	The Netherlands	United States
Arithmetic density	4	103	525	34
Physiological density	101	3,077	1,759	211
Agricultural density	2	861	35	4
Percentage farmers	2	28	2	2
Percentage arable land	4	3	30	17

Physiological Density

Looking at the number of people per area of a certain type of land in a region provides a more meaningful population measure than arithmetic density. Land suited for agriculture is called **arable land**. The number of people per unit area of arable land is called the **physiological density** (Figure 2-11).

Comparing physiological and arithmetic densities helps geographers understand the capacity of the land to yield enough food for the needs of the people. In Egypt, for example, the large difference between the physiological density and arithmetic density, as shown in Table 2-1, indicates that most of the country's land is unsuitable for intensive agriculture. In fact, 97 percent of Egyptians live on just 8 percent of the land, in the Nile River valley and delta, because it is the only area in the country that receives enough moisture (by irrigation from the river) to allow intensive cultivation of crops.

Agricultural Density

Two countries can have similar physiological densities but produce significantly different amounts of food because of different economic conditions. **Agricultural density** is the ratio of the number of farmers to the amount of arable land (Figure 2-12). Table 2-1 shows several examples. Variations in agricultural density help in understanding economic differences. Developed countries have lower agricultural densities because technology and finance allow a few people to farm extensive land areas and feed many people.

To understand relationships between population and resources in a country, geographers examine a country's physiological and agricultural densities together. For example, the physiological densities of both Egypt and the Netherlands are high, but the Dutch have a much lower agricultural density than the Egyptians. Geographers conclude that both the Dutch and Egyptians put heavy pressure on the land to produce food, but the more efficient Dutch agricultural system requires fewer farmers than does the Egyptian system.

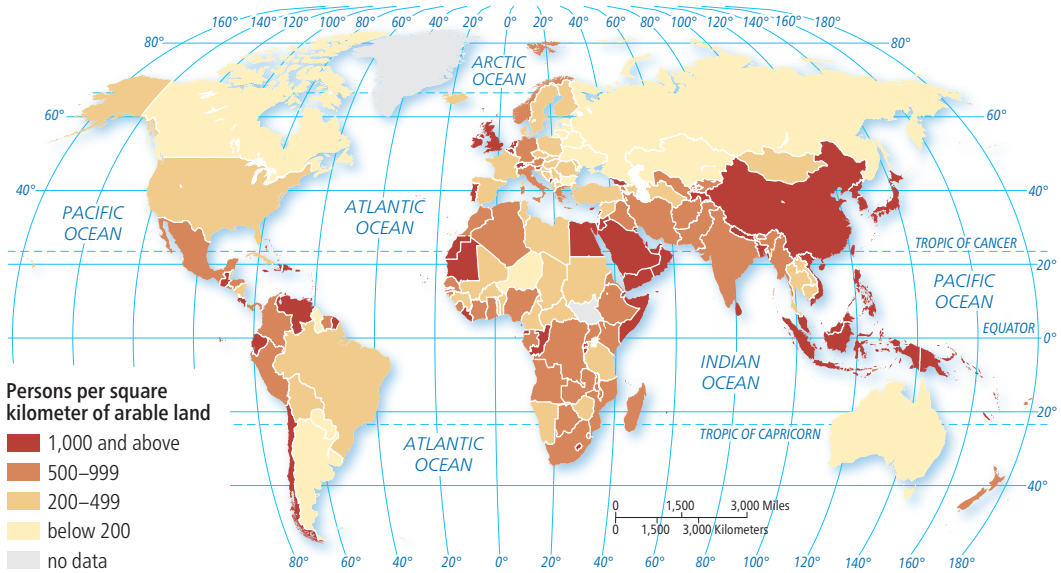


FIGURE 2-11 PHYSIOLOGICAL DENSITY Physiological density provides insights into the relationship between the size of a population and the availability of resources in a region.

Source: Population Reference Bureau

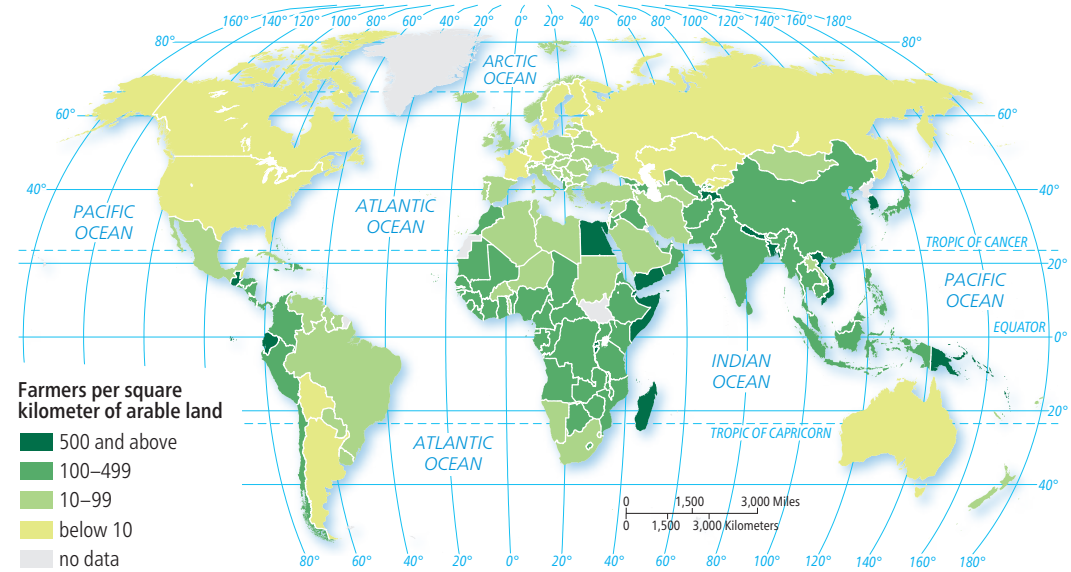


FIGURE 2-12 AGRICULTURAL DENSITY Agricultural density helps account for economic differences between countries.

Sources: Population Reference Bureau and World Bank

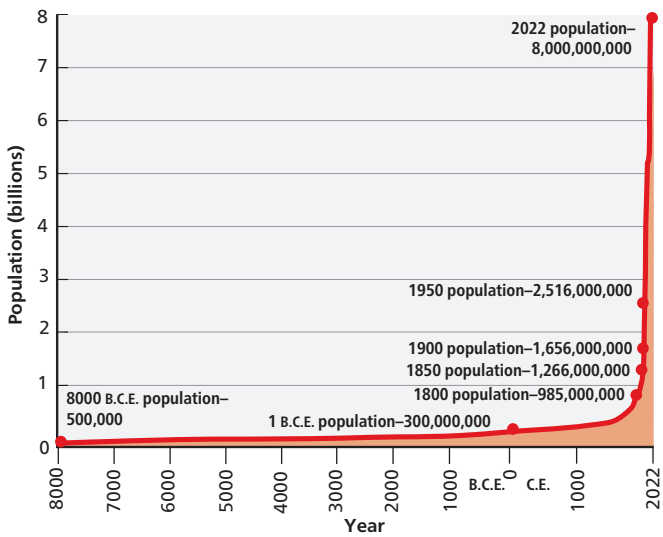
KEY ISSUE

2.2 | Why Is Population Increasing?

Population increases rapidly in places where more people are born than die, and it declines in places where deaths outnumber births. The population of a place also increases or decreases as people move in or out. This element of population change—migration—is discussed in Chapter 3. For most of human history, Earth's population was unchanged at perhaps a half-million. In contrast, about 85 million people are now being added to the population of the world annually.

Natural Increase in History

Learning Outcome 2.2.1 Summarize historical and recent rates of population increase.



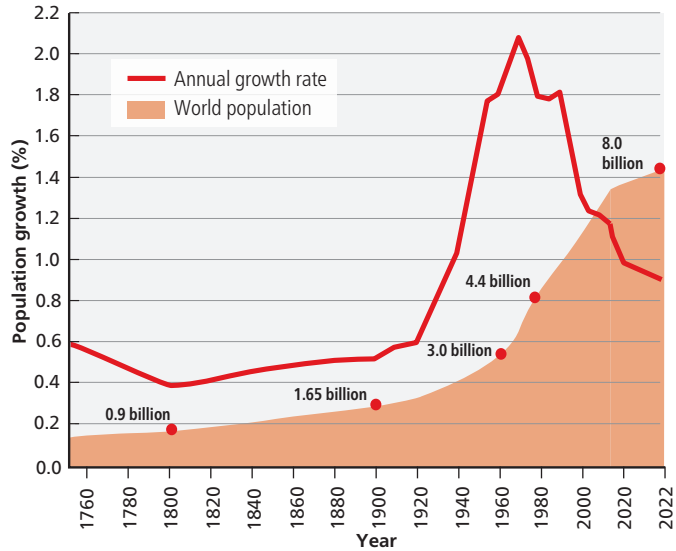
▲ **FIGURE 2-13 WORLD POPULATION GROWTH 8000 B.C.E.–2022 C.E.**

▼ **FIGURE 2-14 LARGE FAMILY HEADS FOR VACATION** 1950s.

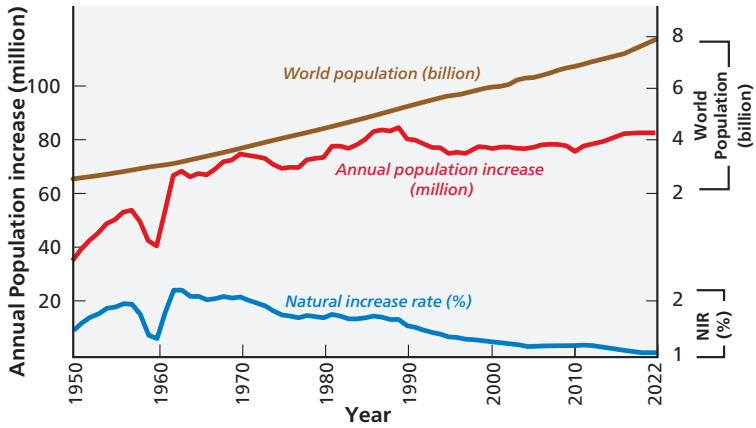
Population growth was essentially zero for most of humanity's several-hundred-thousand-year occupancy of Earth. World population began to grow slowly around 8000 B.C.E., with the emergence of agriculture (Figure 2-13).

During the first half of the twentieth century, population grew at a relatively modest rate, especially during World War I (1914–1918), the Great Depression (1929–1939), and World War II (1939–1945). After the end of World War II, population increased more rapidly (Figure 2-14). Population growth during the second half of the twentieth century was high by historical standards and reached an all-time peak of more than 2 percent per year during the 1960s (Figure 2-15). World population increased from 3 to 4 billion in 14 years, from 4 to 5 billion in 13 years, from 5 to 6 billion in 12 years, from 6 to 7 billion in 12 years, and from 7 to 8 billion in 11 years.

The number of people added annually averaged around 82 million during the first two decades of the twenty-first century (Figure 2-16). As the base continues to grow in the twenty-first century, a change of only one-tenth of 1 percent can produce very large swings in population growth.



▲ **FIGURE 2-15 WORLD POPULATION GROWTH 1750–2022**



▲ **FIGURE 2-16 WORLD POPULATION GROWTH 1950–2022**

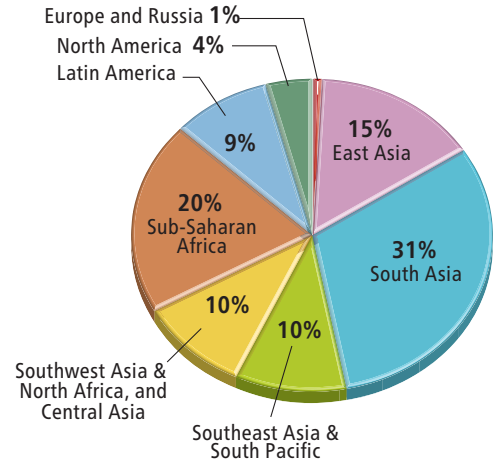
Current Natural Increase

The **natural increase rate (NIR)** is the percentage by which a population grows in a year. The term *natural* means that a country's growth rate excludes migration. During the decade of the 2020s, the world NIR has been around 1.0, meaning that the population of the world has been growing each year by 1.0%.

More than 95 percent of the natural increase is clustered in developing countries. Since 1980, 66 percent of the world's population growth has been in Asia, 20 percent in sub-Saharan Africa, 9 percent in Latin America, 4 percent in North America, and 1 percent in Europe, including Russia (Figure 2-17). In the 2020s, Asia is accounting for more than half of world population growth and Africa for most of the remainder.

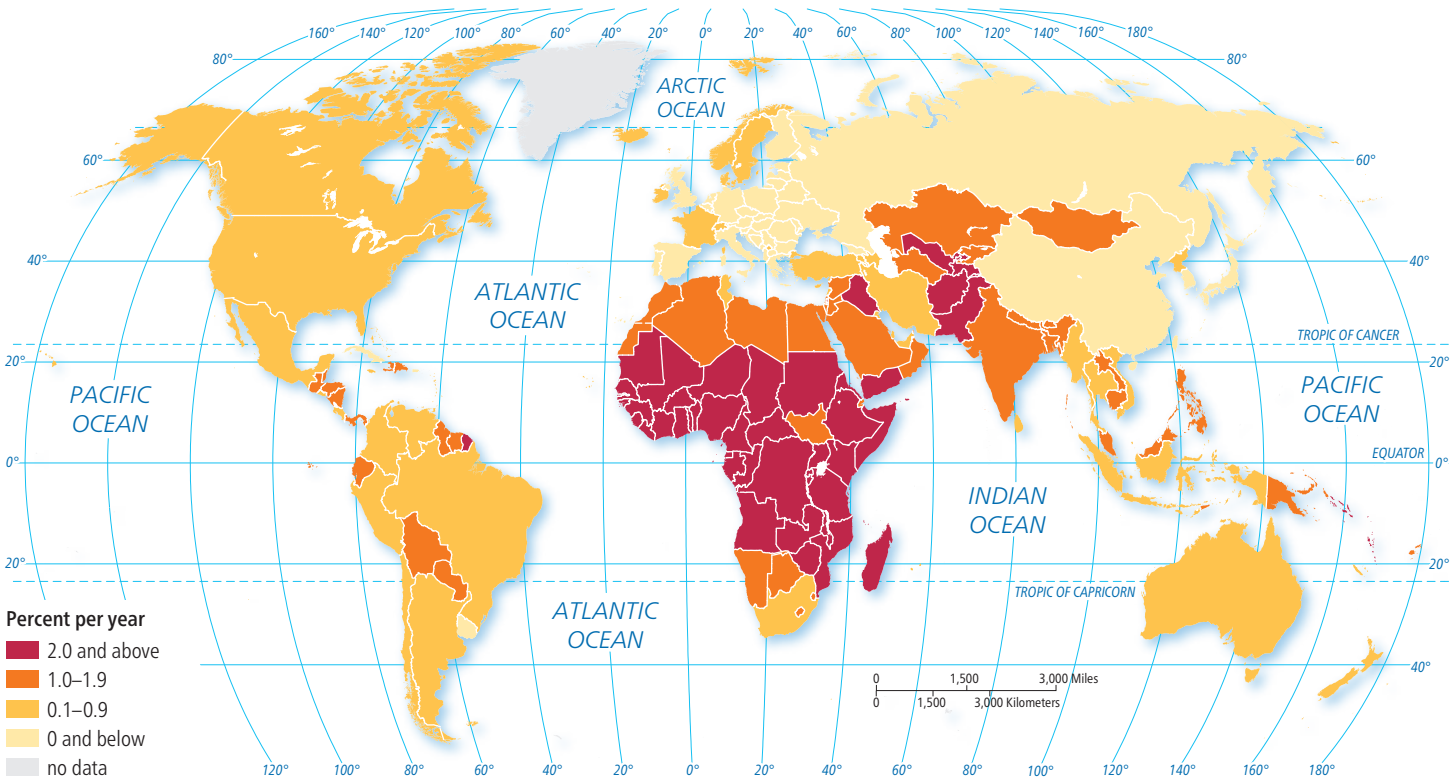
The NIR currently exceeds 2.0 percent in most countries of sub-Saharan Africa, whereas it is negative in Europe, meaning that without the inclusion of immigrants, the population in Europe would actually be declining (Figure 2-18). Regional differences in NIRs point to the fact that population growth may be taking place in countries where there are fewer resources to support it.

The natural increase rate affects the **doubling time**, which is the number of years needed to double a population, assuming a constant rate of natural increase. At the current rate of 0.9 percent per year, world population would double in about 77 years. If the same NIR continued through the twenty-first century, global population in the year 2100 would reach around 16 billion. When the NIR was 2.1 percent in 1968, doubling time was 33 years. Had the 2.1 percent rate continued into the twenty-first century, Earth's population would currently be 10 billion instead of 8 billion. A 2.1 percent NIR through the twenty-first century would produce a total population of around 40 billion in 2100.



▲ **FIGURE 2-17 REGIONAL DISTRIBUTION OF POPULATION GROWTH SINCE 1980**

Pause & Reflect 2.2.1 Which region other than sub-Saharan Africa appears to have the highest natural increase rate?



▲ **FIGURE 2-18 NATURAL INCREASE RATE**

Source: Population Reference Bureau

Births & Deaths

Learning Outcome 2.2.2 Compare global patterns of births and deaths.

Natural increase occurs when births (fertility) exceed deaths (mortality). Various measures provide insights into different aspects of fertility and mortality.

Crude Birth Rate

The **crude birth rate (CBR)** is the total number of live births in a year for every 1,000 people alive in the society. A CBR of 20 means that for every 1,000 people in a country, 20 babies are born over a one-year period.

The world map of CBR (Figure 2-19) mirrors the distribution of NIR. As is the case with NIRs, the highest CBRs are in sub-Saharan Africa, and the lowest are in Europe. Many sub-Saharan African countries have a CBR over 35, whereas many European countries have a CBR below 10.

Total Fertility Rate

The **total fertility rate (TFR)** measures the number of births in a society (Figure 2-20). The TFR is the average number of children a woman will have throughout her childbearing years (roughly ages 15 through 49). To compute the TFR, demographers assume that a woman reaching a particular age in the future will be just as likely to have a child as are women of that age today. Thus, the CBR provides a picture of a society as a whole in a given year, whereas the TFR attempts to predict the future behavior of individual women in a world of rapid cultural change.

The TFR for the world as a whole is 2.3, and, again, the figures vary between developed and developing countries. The TFR is 4.6 in sub-Saharan Africa, compared to 1.5 in Europe.

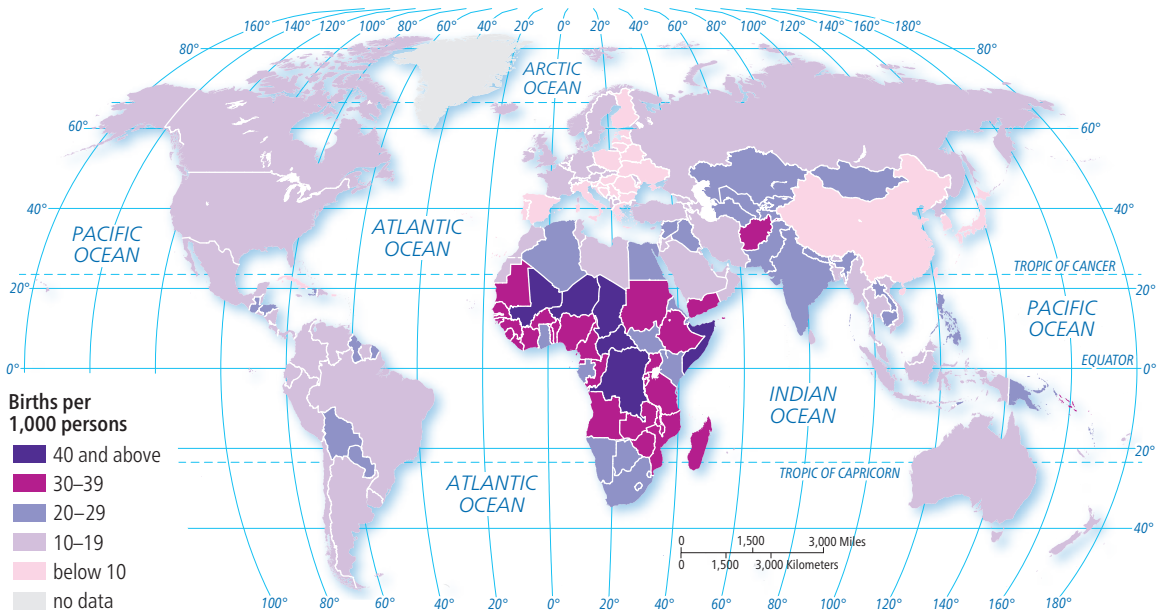


FIGURE 2-19 CRUDE BIRTH RATE (CBR) The global distribution of CBRs parallels that of NIRs. The countries with the highest CBRs are concentrated in Africa and Southwest Asia.
Source: Population Reference Bureau

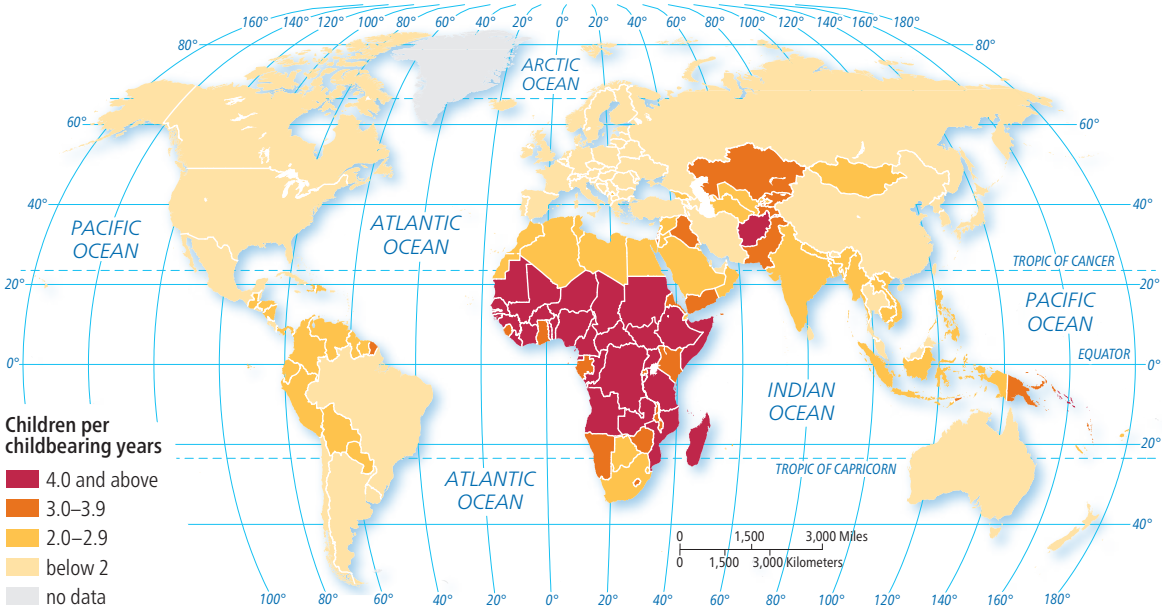


FIGURE 2-20 TOTAL FERTILITY RATE (TFR) As with NIRs and CBRs, the countries with the highest TFRs are concentrated in Africa and Southwest Asia.
Source: Population Reference Bureau

Infant Mortality Rate

The **infant mortality rate (IMR)** is the annual number of deaths of infants under one year of age, compared with total live births (Figure 2-21). The IMR is usually expressed as the number of deaths among infants per 1,000 births rather than as a percentage (per 100). In general, the IMR reflects the quality of a country's health-care system.

The global distribution of IMRs follows the pattern that by now has become familiar. Lower IMRs are found in countries with well-trained doctors and nurses, modern hospitals, and large supplies of medicine. The IMR is 3 in Europe, compared with 50 in sub-Saharan Africa. In other words, before reaching their first birthday, 1 in 20 babies die in sub-Saharan Africa and 1 in 333 babies die in Europe.

Crude Death Rate

The **crude death rate (CDR)** is the total number of deaths in a year for every 1,000 people alive in the society. The CDR does not follow the same regional pattern as the NIR and CBR (Figure 2-22). The combined CDR for all developing countries is actually lower than the combined rate for all developed countries. Furthermore, the variation between the world's highest and lowest CDRs is much less extreme than the variation in CBRs. The highest CDR in the world is 22, and the lowest is 1 – a difference of 21 – whereas CBRs for countries range from 5 to 45, a spread of 40. The CDR is 7 in developing countries and 12 in developed countries, whereas the CBR is 19 in developing countries and 10 in developed countries.

Why does the United Kingdom, with one of the world's highest per capita incomes, have a higher CDR than Benin, which has one of the world's lowest per capita incomes? Why does Germany, with one of the world's highest per capita incomes and one of the world's best health-care systems, have one of the world's highest CDRs? The answer is that the populations of different countries are at various stages in an important process known as the *demographic transition*.

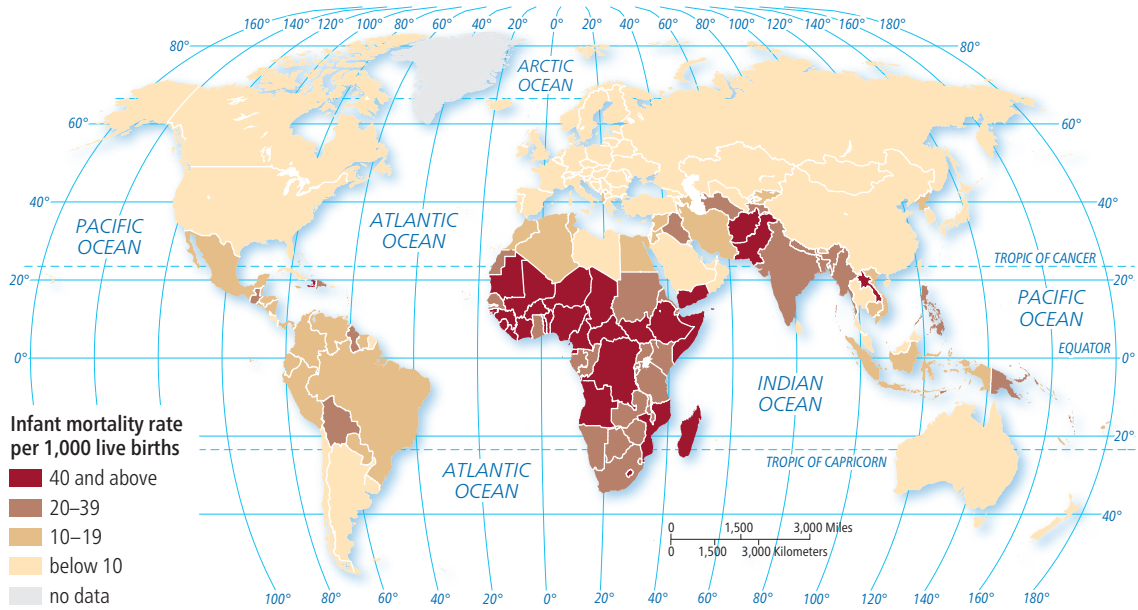


FIGURE 2-21 INFANT MORTALITY RATE (IMR) The highest IMRs are in sub-Saharan Africa, and the lowest are in Europe.
Source: Population Reference Bureau

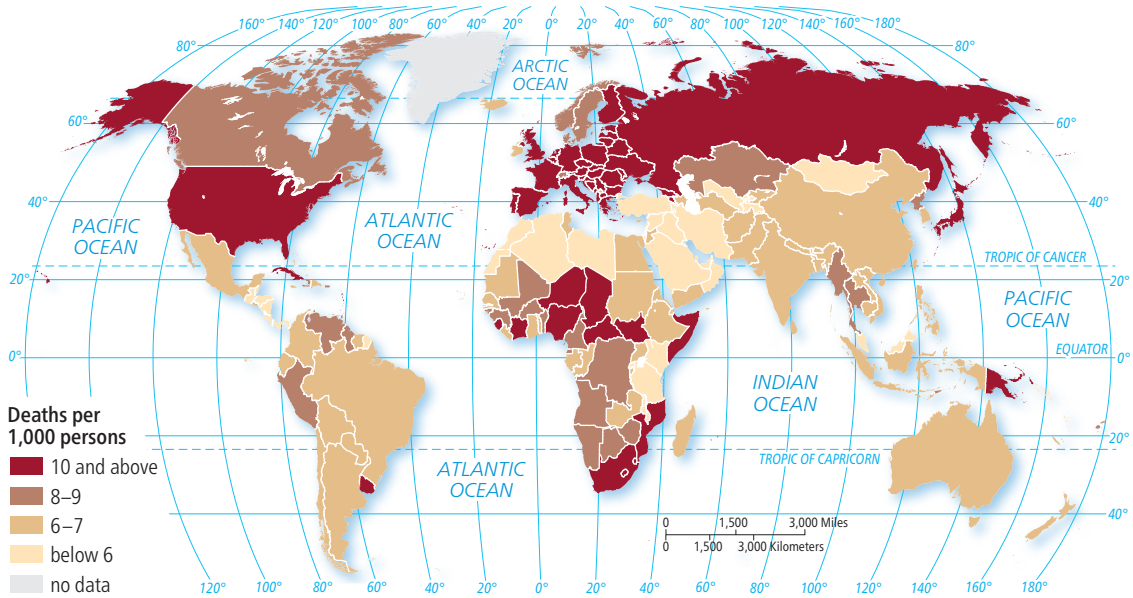


FIGURE 2-22 CRUDE DEATH RATE (CDR) The global pattern of CDRs varies from those for the other demographic variables already mapped in this chapter. The demographic transition helps to explain the distinctive distribution of CDRs.
Source: Population Reference Bureau

Pause & Reflect 2.2.2
What region of the world appears to have the lowest CDR? What might account for that?

The Demographic Transition

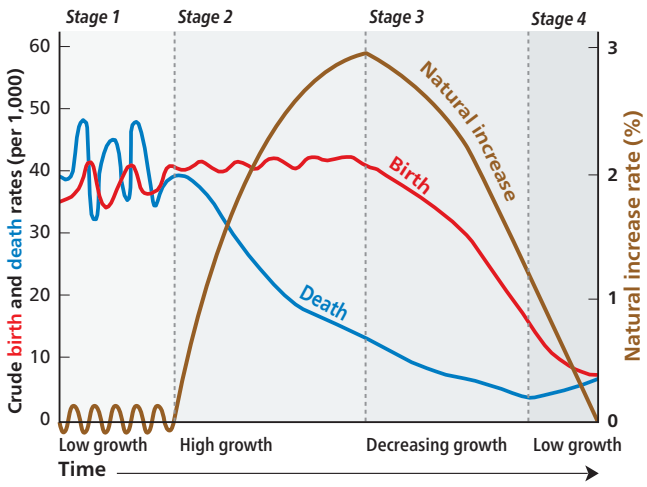
Learning Outcome 2.2.3 Explain the stages of the demographic transition model.

All countries have experienced some changes in NIR, CBR, and CDR, but at different times and at different rates. The demographic transition helps to explain these differences. The **demographic transition** is a process of change in a society's population from high crude birth and death rates and a low rate of natural increase to low crude birth and death rates, a low rate of natural increase, and higher total population.

Authoritative demographic sources such as the Population Reference Bureau, the World Bank, and the United Nations currently consider the demographic transition to consist of four stages (Figure 2-23). As discussed later in this chapter, some demographers anticipate a stage 5 (refer to Figure 2-51).

The four-stage demographic transition is characterized by two big breaks with the past. The first break with the past – the sudden drop in the death rate that comes from technological innovation – has been accomplished everywhere. The second break – the sudden drop in the birth rate that comes from changing social customs – has yet to be achieved in many countries.

FIGURE 2-23 DEMOGRAPHIC TRANSITION MODEL



Stage 1: Low Growth

- Very high CBR
- Very high CDR
- Very low NIR

Most of human history was spent in stage 1 of the demographic transition, but today no country remains in stage 1. Every nation has moved on to at least stage 2 and has experienced profound changes in population. During most of stage 1, people depended on hunting and gathering for food (see Chapter 10). When food was easily obtained, population increased, but when people were unable to locate enough animals or vegetation to survive, population declined.

Stage 2: High Growth

- Still high CBR
- Rapidly declining CDR
- Very high NIR

Rapidly declining death rates and very high birth rates produce a very high natural increase. Europe and North America entered stage 2 of the demographic transition after 1750 as a result of the **Industrial Revolution**, which began in the United Kingdom in the late eighteenth century and diffused to the European continent and North America during the nineteenth century. The Industrial Revolution was a conjunction of major improvements in manufacturing goods and delivering them to market (see Chapter 11). The result of this transformation was an unprecedented level of wealth, some of which was used to make communities healthier places to live.

Stage 2 of the demographic transition did not diffuse to Africa, Asia, and Latin America until around 1950, when the **medical revolution** extended to the developing world. Technologies invented in Europe and North America improved the diagnosis and treatment of disease. New medical practices made possible by the medical revolution, such as the use of antibiotics, vaccines, anesthesia, and x-rays, eliminated many of the traditional causes of death in developing countries.

Benin is a country in Africa classified by the United Nations as low developing. Only 16 percent of married women ages 15–49 practice family planning, a factor in the country's high CBR. Benin's death rate declined rapidly beginning in the 1970s when the World Health Organization launched a program to immunize children in a number of countries, including Benin. This program helped reduce the CDR in Benin, transitioning the country from stage 1 to stage 2, where it is now (Figures 2-24 and 2-25).

FIGURE 2-24 DEMOGRAPHIC TRANSITION STAGE 2: BENIN

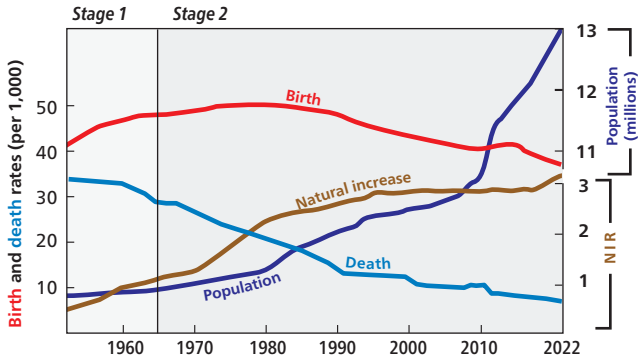


FIGURE 2-25 BENIN: HIGH CRUDE BIRTH RATE

Stage 3: Moderate Growth

- Rapidly declining CBR
- Moderately declining CDR
- Moderate NIR

A country moves from stage 2 to stage 3 of the demographic transition when the CBR begins to drop sharply. During stage 3, the population continues to grow because the CBR is still greater than the CDR. But the NIR is more modest in countries in stage 3 than in those in stage 2 because the gap between the CBR and the CDR narrows (Figure 2-26).

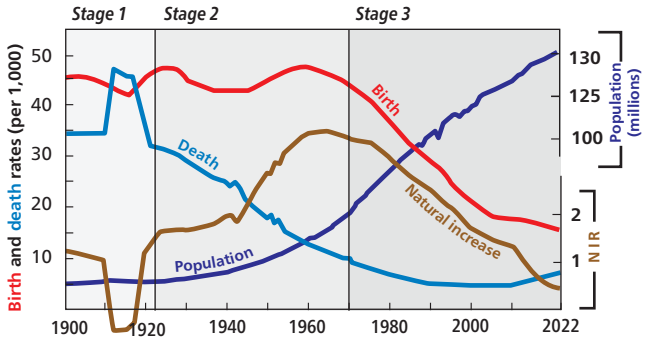
A society enters stage 3 when people have fewer children. The decision people make to have fewer children is partly a delayed reaction to a decline in mortality. Economic changes during the transition from stage 2 to stage 3 also induce some people to have fewer offspring.

Most countries in Europe and North America (including the United States) moved from stage 2 to stage 3 of the demographic transition during the first half of the twentieth century. Many countries of Asia and Latin America, including Mexico, went through the transition into stage 3 during the second half of the twentieth century.

Mexico entered stage 2 of the demographic transition when the country experienced a combination of lower death rates and higher birth rates. The higher birth rates in Mexico occurred in part because the government proclaimed that higher birth rates would be good for the country's economic growth (Figure 2-27).

A dramatic decline in Mexico's birth rates came in the 1970s. In 1974, an amendment to Mexico's constitution guaranteed families the legal right to decide on the number of children they would have and the spacing of children. In 1979, Mexico established a National Population Council to promote family planning through education.

▼ FIGURE 2-26 DEMOGRAPHIC TRANSITION STAGE 3: MEXICO



Stage 4: Low Growth

- Very low CBR
- Low or slightly increasing CDR
- 0 or negative NIR

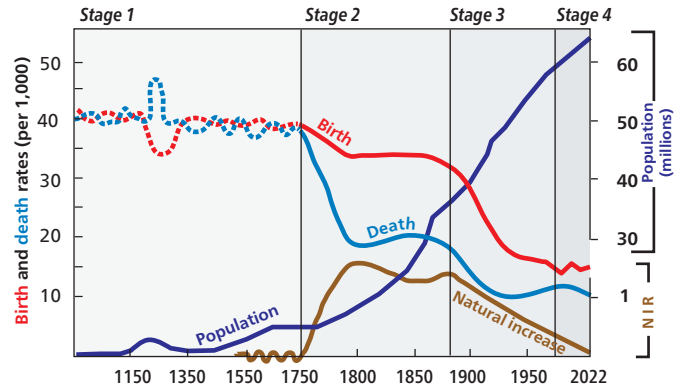
A country reaches stage 4 when the CBR declines to the point where it equals the CDR and the NIR approaches zero (Figure 2-28). This condition is called **zero population growth (ZPG)**, a term often applied to stage 4 countries.

Social customs explain the movement to stage 4. Increasingly, women in stage 4 societies enter the labor force rather than remain at home as full-time homemakers. In stage 4, people have access to a wider variety of birth-control methods.

The United Kingdom entered stage 2 of the demographic transition in the late 1700s, as a result of the Industrial Revolution. Stage 3 occurred there in the twentieth century, and it entered stage 4 into the twenty-first century. As a result, elderly people now outnumber young people in the United Kingdom (Figure 2-29).

Pause & Reflect 2.2.3 Name a country not in Europe that appears to be in stage 4, according to Figure 2-18, Figure 2-19, and Figure 2-22.

▼ FIGURE 2-28 DEMOGRAPHIC TRANSITION STAGE 4: UNITED KINGDOM



▼ FIGURE 2-27 MEXICO: MODERATE NIR

▼ FIGURE 2-29 UNITED KINGDOM: AGING POPULATION

KEY ISSUE

2.3 | Why Does Health Vary by Region?

As world NIR slows and more countries move into stage 3 or 4 of the demographic transition, geographers increasingly turn their attention to the health of the world's 8 billion people. Countries in different stages of the demographic transition possess different resources to care for people who are sick.

Aging & Health

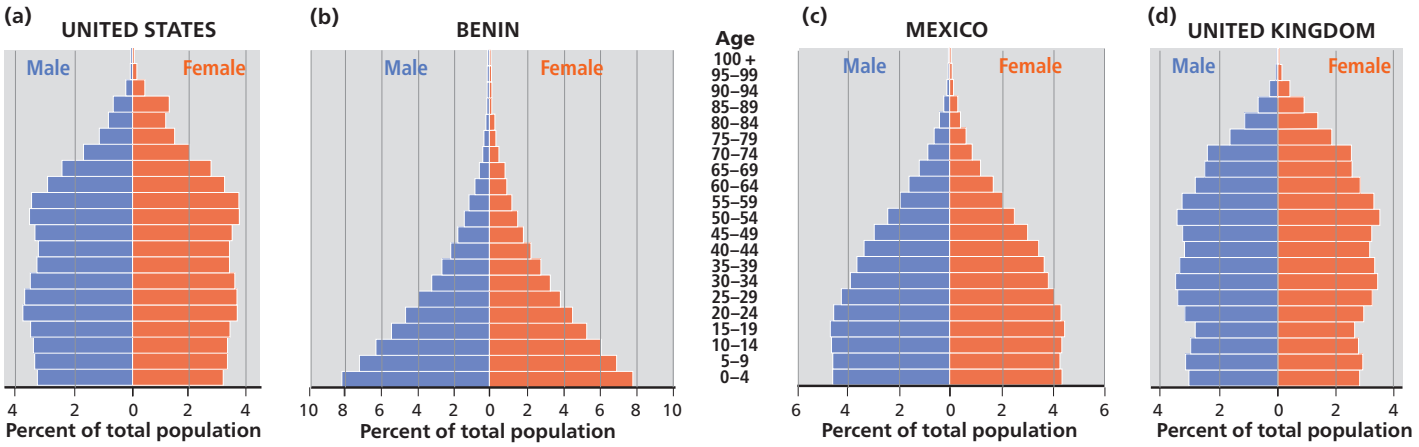
Learning Outcome 2.3.1 Relate the demographic transition to the distribution of age groups.

A country's stage of the demographic transition determines the percentage of people in different age groups. A country in stage 2 of the demographic transition typically has a relatively high percentage of young people, whereas a country in stage 4 has a relatively high percentage of elderly people. The percentage of different age groups helps to explain a country's distinctive health challenges.

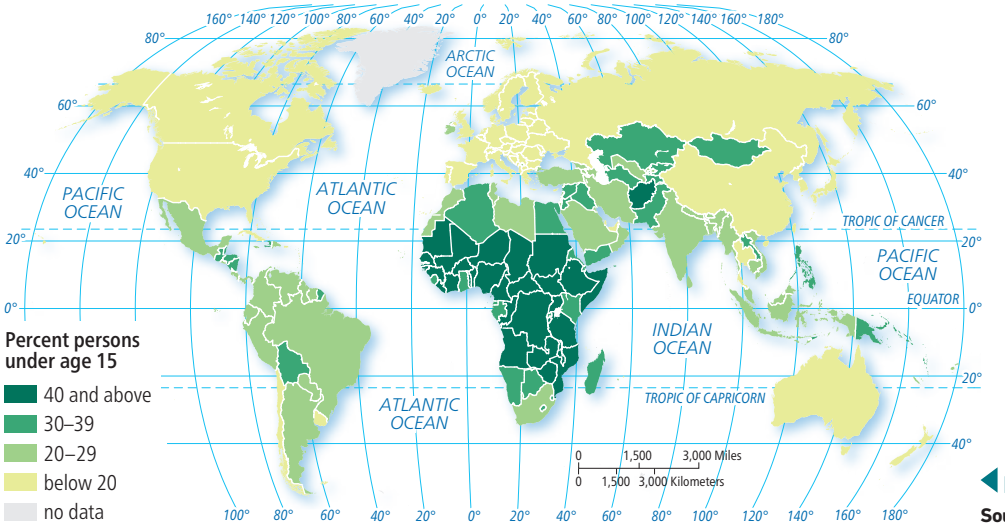
Population Pyramids

A **population pyramid** is a bar graph that displays the percentage of a community's population for each age and gender. A country that is in stage 2 of the demographic transition, such as Benin, has a pyramid with a broader base than that of a country in stage 4, such as the United Kingdom, indicating Benin has a higher percentage of young people. In contrast to Benin's pyramid of more evenly tapering levels, the levels of the United Kingdom's pyramid are wider on the right because in the United Kingdom, women live longer than men (Figure 2-30).

Developing countries in stage 2 of the demographic transition have higher percentages of young people than do countries in stage 4 (Figure 2-31). This is a consequence of the higher CBR and TFR in stage 2 countries as well as the lower life expectancy. Worldwide, 25 percent are under age 15. Those under 15 comprise 16 percent of the population in developed countries, 27 percent in developing countries, and 42 percent in sub-Saharan Africa.



▲ **FIGURE 2-30 POPULATION PYRAMIDS FOR 4 COUNTRIES** (a) United States, (b) Benin, (c) Mexico, (d) United Kingdom.



The large percentage of children in sub-Saharan Africa strains the ability of these countries to provide needed services such as schools, hospitals, and day-care centers. On the other hand, the "graying" of the population places a burden on developed countries to meet the needs of older people for income and medical care after they retire from jobs.

◀ **FIGURE 2-31 POPULATION UNDER AGE 15**
Source: Population Reference Bureau

Caring for Older People

Life expectancy is the average number of years an individual can be expected to live, given current social, economic, and medical conditions. Life expectancy at birth measures the average number of years a newborn infant can expect to live at current mortality levels. People on average live much longer in developed countries than in developing ones (Figures 2-32). Life expectancy at birth also varies widely within the United States (Figure 2-33).

As countries progress through the demographic transition, they face increasing percentages of people who no longer work but still require adequate levels of income and medical care. In the United States, the percentage of the population over 65 varies widely; the highest percentages are in states to which many older people migrate and in states from which many younger people leave.

The **dependency ratio** is the number of people who are too young or too old to work compared to the number of people in their productive years. Dependents are normally classified as people under age 15 and 65 and over. The larger the dependency ratio, the greater the financial burden on those who are working to support those who do not. The dependency ratio is 54 percent in Europe, compared to 82 percent in sub-Saharan Africa.

The "graying" population in developed countries places much of the burden of their well-being on the government. The **potential support ratio** (also known as the **elderly support ratio**) is the number of working-age people (ages 15 to 64) divided by the number of elderly persons (65 and older) (Figure 2-34).

The world's potential support ratio is currently around 6.5, meaning that there are 6.5 people of working age for every elderly person. In 2050, the ratio is expected to decline to around 4, meaning that there will be only 4 people of working age available to support elderly people who have retired from work. Thus, as the ratio gets smaller, fewer workers are available to contribute to pensions, health care, and other support that older people need.

Pause & Reflect 2.3.1 If the potential support ratio is declining, does that mean the percentage of elderly people is increasing or decreasing?

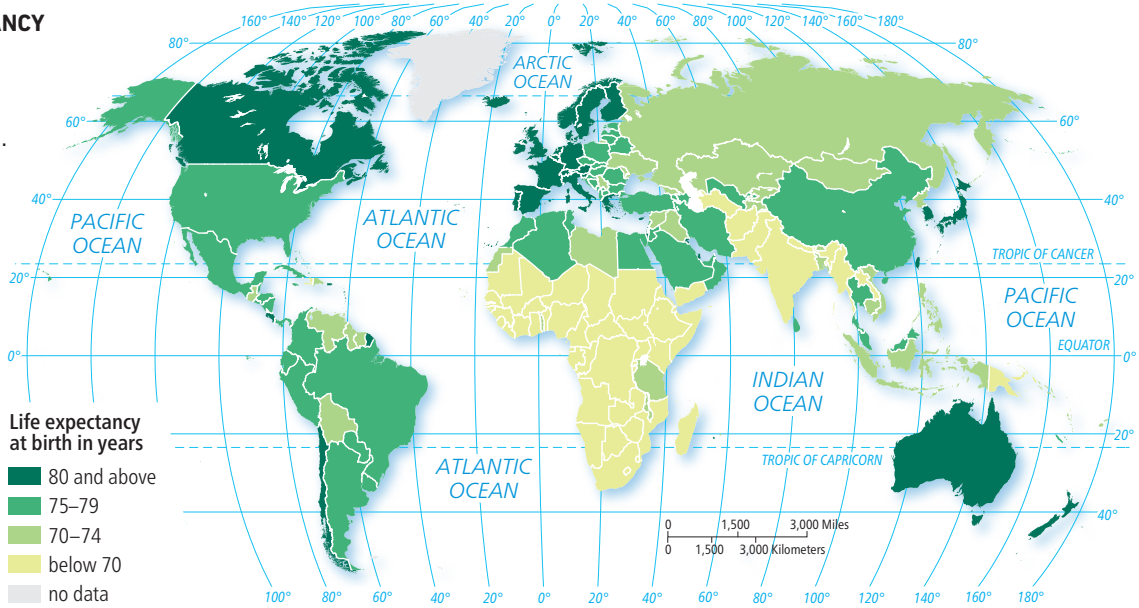


FIGURE 2-32 LIFE EXPECTANCY AT BIRTH: WORLD A baby born today has a life expectancy of 78 years in Europe but only 60 years in sub-Saharan Africa.
Source: Population Reference Bureau

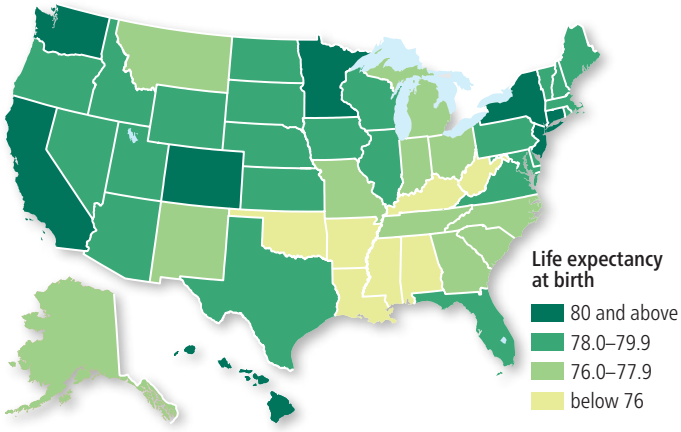


FIGURE 2-33 LIFE EXPECTANCY AT BIRTH: U.S. STATES

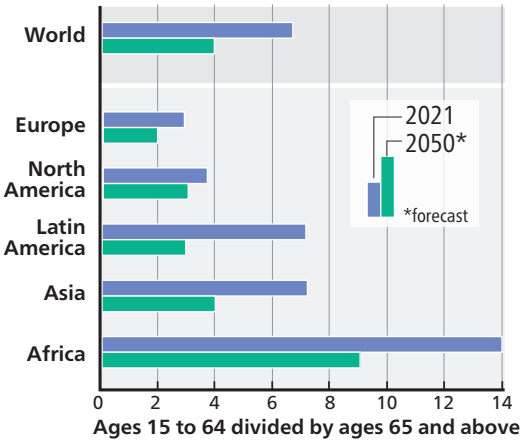


FIGURE 2-34 POTENTIAL SUPPORT RATIO

Health & Gender

Learning Outcome 2.3.2 Explain reasons for health risks to baby girls and mothers.

Females face especially challenging health risks that profoundly affect the size and composition of the population of individual countries and the world as a whole. These health risks derive from the biological fact of being born female. The risk for females is especially acute at childbirth. Both the mother and the baby girls may be at risk.

Baby Girls at Risk

Around 700,000 female babies are "missing" every year in China and India as a result of gender-based sex selection. The United Nations Population Fund estimates that, overall, 143 million females have gone missing throughout the past several decades. The females are missing either because the fetus was aborted before birth, the female baby was killed in infancy, or the newborn female is being raised somewhere remote and not reported to census and health officials. The result is more boys than girls (Figure 2-35).

▼ **FIGURE 2-35 CHINA: MORE BOYS THAN GIRLS** Liufu, China.

Sex Ratio

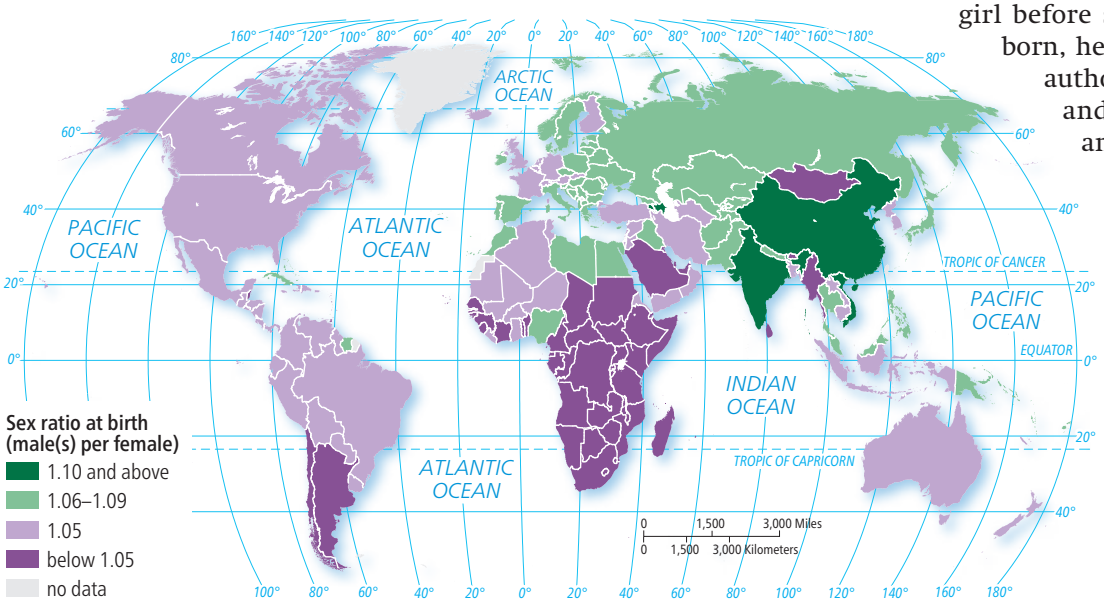
We know about the large number of missing females in China and India because of the **sex ratio**, which is the number of males per 100 females in the population. The standard biological level for humans at birth is around 105 male babies for every 100 female babies. Scientists are not sure why biologically a few more males than females are born. The standard biological ratio is characteristic of the developed regions of North America and Europe as well as in the developing regions of Latin America and sub-Saharan Africa. However, the sex ratio at birth is 111:100 in China and India (Figure 2-36). The percentage of newborn females in the world's two most populous countries is much too low to be random. The United Nations concludes that the "root cause" of the unequal sex ratio is gender inequality.

The extremely low percentage of female babies in China and India results from cultural preference on the part of parents to have sons rather than daughters. Sons are regarded as more likely than girls to help the family economically. Government policies in these two countries to promote smaller families have resulted in families with more male babies than female babies. Many Chinese and Indians have decided that if they are going to have a small number of children, they want them to be boys.

Efforts to ban gender-based sex selection have been ineffective because people instead seek out unregulated providers of these services. An ultrasound can reveal the gender of a fetus before birth, allowing parents to abort a baby girl before she is born. If a baby girl is born, her parents may hide her from authorities in a remote rural area, and she may receive less food and health care than would a baby boy.

Aside from ethical questions about the devaluation of female lives, the widespread practice of sex selection in China and India is creating a practical problem. As the babies grow to adulthood, these countries are left with an enormous surplus of men who are unable to find women to marry.

▼ **FIGURE 2-36 SEX RATIO AT BIRTH**
Source: CIA World Facebook.

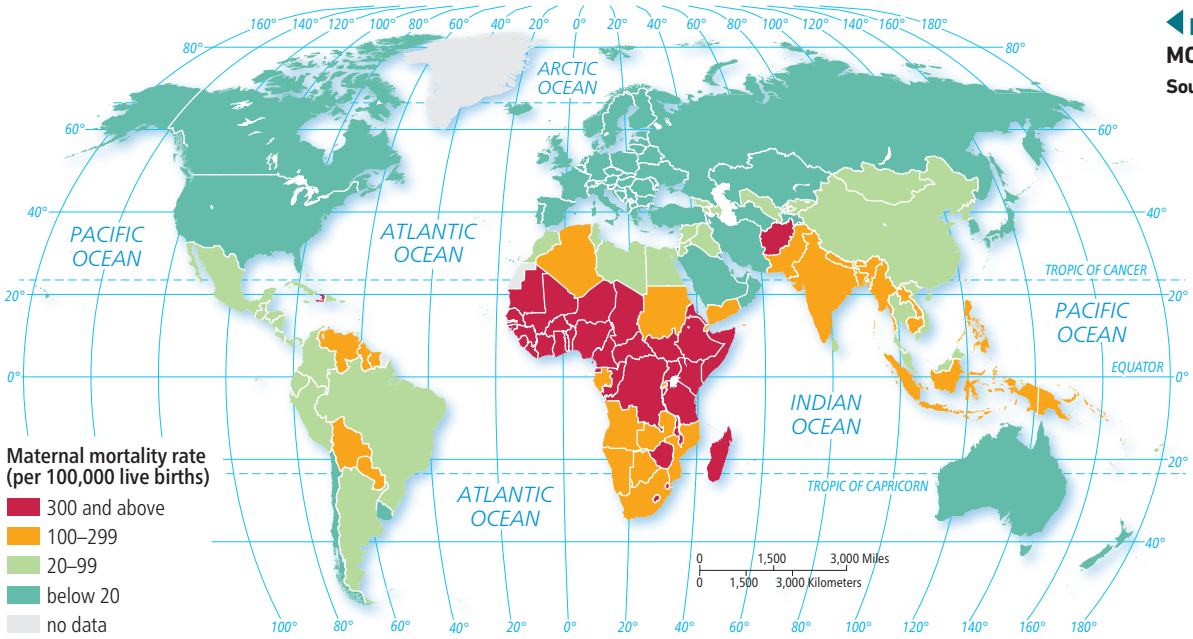


Mothers at Risk

The **maternal mortality rate** is the annual number of female deaths per 100,000 live births from any cause related to or aggravated by pregnancy. Developed countries have medical facilities, advanced technologies, and trained personnel to limit the incidence of life-threatening conditions during childbirth. Physicians can monitor and treat conditions prior to delivery and manage complications during and after delivery (Figure 2-37). According to the U.N., the most common cause of maternal death in developing countries is heavy bleeding ("obstetrical hemorrhage"), followed by high blood pressure ("hypertensive disorders of pregnancy").

The worldwide maternal mortality rate in 2020 was 152 deaths per 100,000 live births (Figure 2-38). The rate was 302 in sub-Saharan Africa, compared to only 5 in Europe. Nonetheless, the world has made progress: The world maternal mortality rate was 385 in 1990 and 342 in 2000.

▲ **FIGURE 2-37 GIVING BIRTH, KOLKATA, INDIA** Training midwifes at Kolkata Nursing College.



◀ **FIGURE 2-38 MATERNAL MORTALITY RATE**
Source: World Health Organization

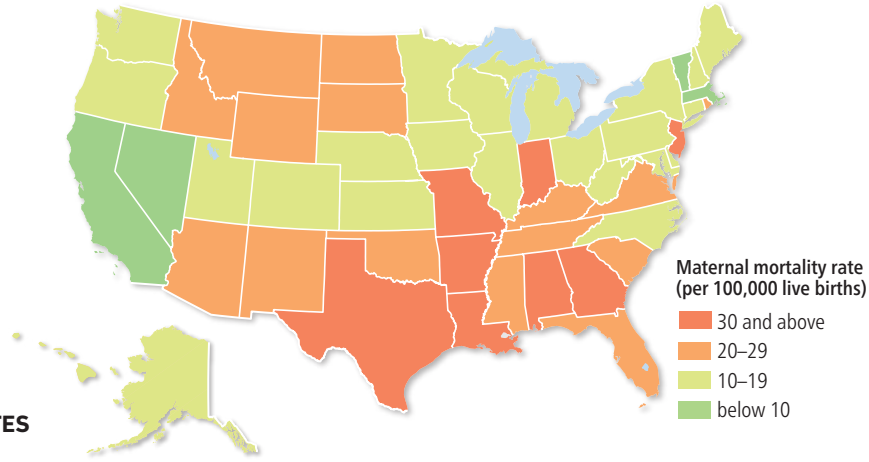
U.S. Maternal Mortality

The maternal mortality rate in the United States (35) is higher than in other developed countries. In addition, the United States is one of only a dozen countries and the only developed country where the rate has increased since 1990.

The higher maternal mortality rate is attributable to difficulties faced by its people with low incomes to access health care. Women who lack health insurance are four times more likely to die of a pregnancy-related complication than those with health insurance.

The maternal mortality rate varies widely among U.S. states. Several southern states have rates that are more than twice as high as the national average (Figure 2-39).

Pause & Reflect 2.3.2 What other populous country in Asia, in addition to China and India, appears to have "missing" females?



▶ **FIGURE 2-39 MATERNAL MORTALITY RATE, U.S. STATES**
Source: America's Health Rankings

Medical Services

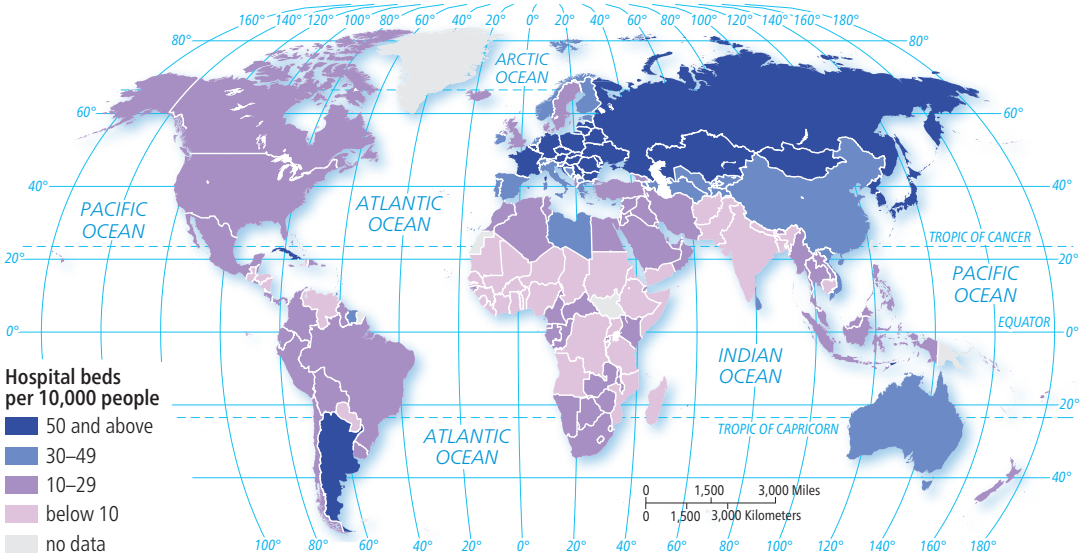
Learning Outcome 2.3.3 Describe differences in health-care services among countries.

Health conditions vary around the world. Countries possess different resources to care for people who are sick. Developed countries use part of their wealth to provide publicly funded medical care to all citizens. The high expenditure on health care in developed countries is reflected in medical facilities.

Medical Facilities

Many countries in Europe have more than 50 hospital beds per 10,000 people, compared to fewer than 30 in sub-Saharan Africa and South and Southwest Asia (Figure 2-40).

▼ FIGURE 2-40 HOSPITAL BEDS PER 10,000 PEOPLE
Source: United Nations

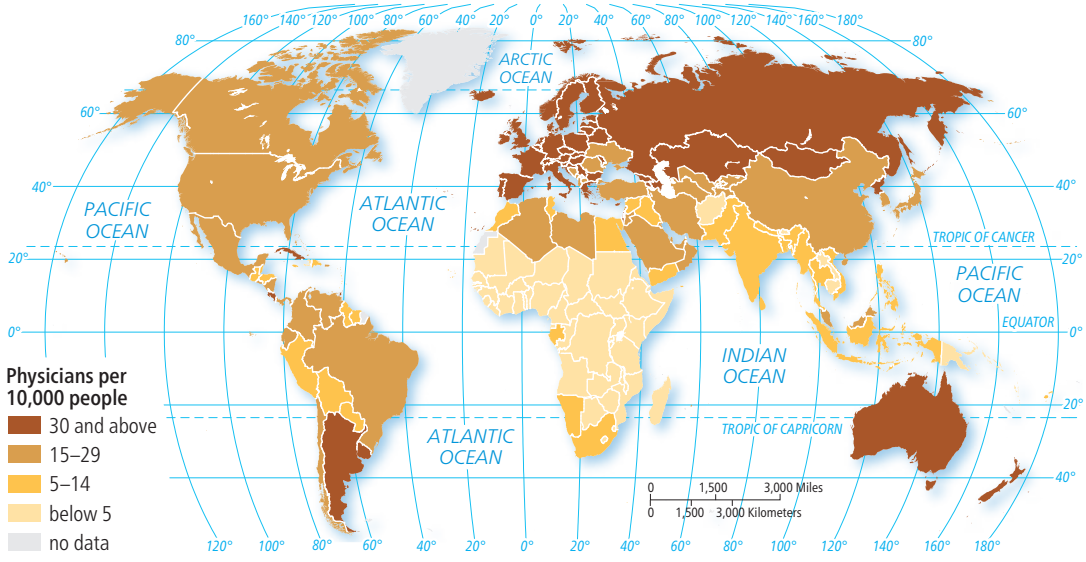


Physicians

The number of physicians also varies widely between developed countries and developing countries (Figure 2-41). Europe has more than 30 physicians per 10,000 people, compared to fewer than 5 in sub-Saharan Africa (Figure 2-42).

▲ FIGURE 2-41 PHYSICIANS IN EUROPE A team of doctors performs brain surgery, Bordeaux, France.

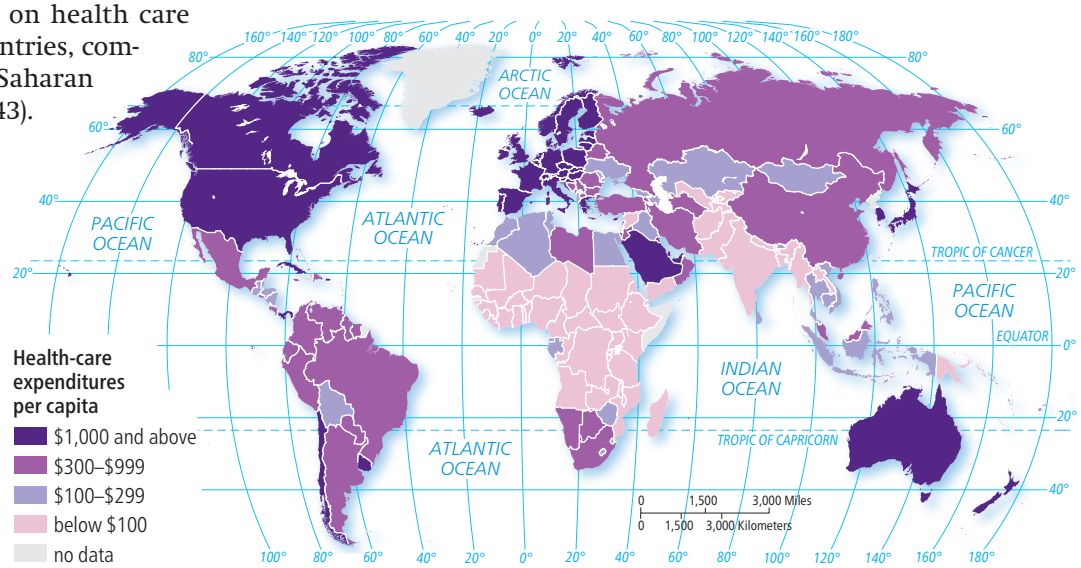
▶ FIGURE 2-42 PHYSICIANS PER 10,000 PEOPLE
Source: World Bank



Health Care Expenditures

Annual per capita expenditure on health care exceeds $1,000 in developed countries, compared to less than $100 in sub-Saharan Africa and South Asia (Figure 2-43).

FIGURE 2-43 HEALTH-CARE EXPENDITURE PER CAPITA
Source: World Health Organization



Government Expenditures on Health Care

In most developed countries, health care is a public service that is available at little or no cost.

Expenditure on health care exceeds 10 percent of all government spending in Europe and North America (Figure 2-44), compared to less than 5 percent in sub-Saharan Africa and South Asia. So not only do developed countries spend more on health care, they also spend a higher percentage of their wealth, measured by the gross domestic product (GDP), on health care (Figure 2-45).

Developed countries are hard-pressed to maintain their current levels of public assistance. In the past, economic growth permitted these states to finance generous health-care programs with little difficulty. But in recent years, economic growth has slowed while the percentage of people needing public assistance has increased. Governments have faced a choice between reducing benefits and increasing taxes to pay for them. In some of the developing countries, threats to health and sustainability are not so much financial as environmental. For example, rising sea levels threaten low-lying countries in the Pacific Ocean, such as Kiribati (see Figure 3-42).

Pause & Reflect 2.3.3 Why might levels of hospital beds and physicians in developed countries of Europe be higher than in North America?

FIGURE 2-44 PRIVATE HEALTH CARE IN THE UNITED STATES Cleveland Clinic.

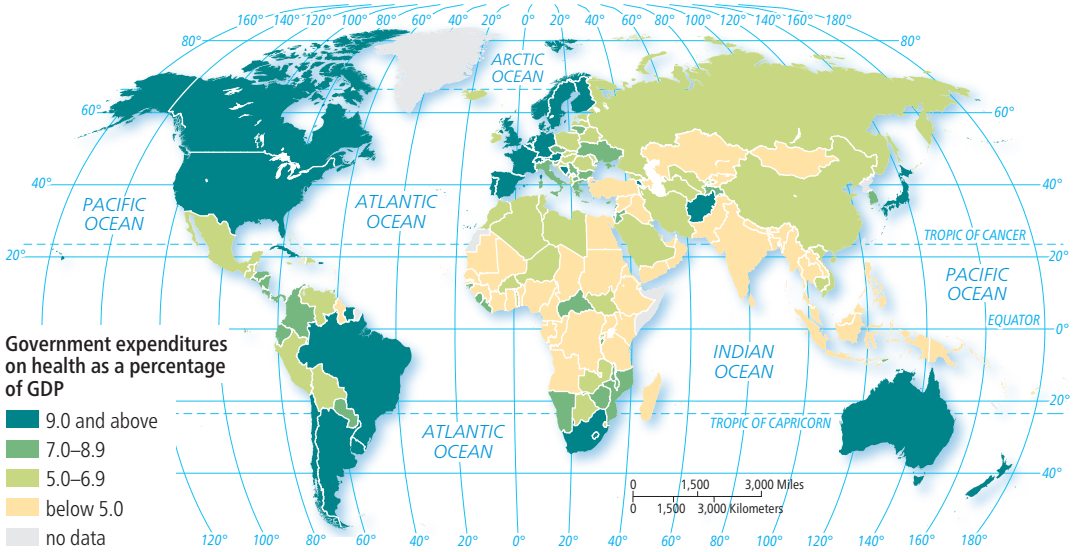


FIGURE 2-45 GOVERNMENT EXPENDITURES ON HEALTH CARE AS PERCENTAGE OF GDP

Epidemiologic Transition

Learning Outcome 2.3.4 Explain four stages in the epidemiologic transition.

Epidemiology is the branch of medical science concerned with the incidence, distribution, and control of diseases that are prevalent among a population at a particular time and are produced by some special causes not generally present in the affected place. Epidemiologists rely heavily on geographic concepts such as scale and connection because measures to control and prevent an epidemic derive from understanding its distinctive distribution and method of diffusion.

The **epidemiologic transition** focuses on distinctive health threats to a population in each stage of its demographic transition. The concept of the epidemiologic transition was originally formulated by epidemiologist Abdel Omran in 1971.

Stage 1: Pestilence & Famine

In stage 1 of the epidemiologic transition, epidemics and pandemics are principal causes of human deaths, along with accidents and attacks by animals and other humans. Malthus called these causes of deaths "natural checks" on the growth of the human population in stage 1 of the demographic transition. An **epidemic** is a widespread occurrence of an infectious disease in a community at a particular time. An epidemic affects many persons at the same time and spreads from person to person in a locality where the disease is not permanently prevalent. A **pandemic** is an epidemic that occurs over a wide geographic area and affects a very high proportion of the population at the same time.

History's most violent stage 1 pandemic was the Black Plague (bubonic plague), which was probably transmitted to humans by fleas from infected rats. About 25 million Europeans – at least one-half of the continent's population – died between 1347 and 1350.

Stage 2: Receding Pandemics

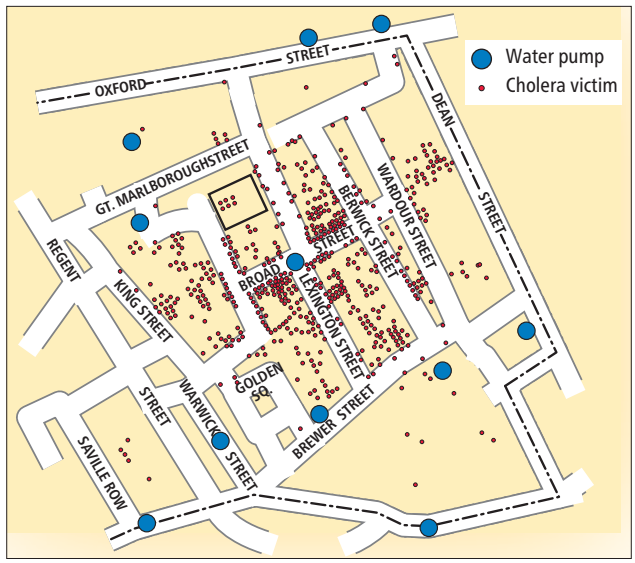
Stage 2 of the epidemiologic transition is the stage of receding pandemics as a result of improved sanitation, nutrition, and medicine. The Industrial Revolution brought about such improvements, thereby reducing the spread of infectious disease and propelling populations into stage 2 of the epidemiologic transition.

During the Industrial Revolution, a century before the invention of computers, a mapping technique that anticipated GIS helped to explain and battle the stage 2 pandemic of cholera in nineteenth-century London. At the time, cholera, a disease of the intestines, was particularly deadly. To understand cholera, Dr. John Snow (1813–1858), a British physician (not a geographer), created a hand-made GIS in 1854. On a map of London's Soho neighborhood, Snow overlaid two other maps, one showing the addresses of cholera victims and the other the location of water pumps – which for many residents of Soho were the principal sources of water for drinking, cleaning, and cooking (Figure 2-46).

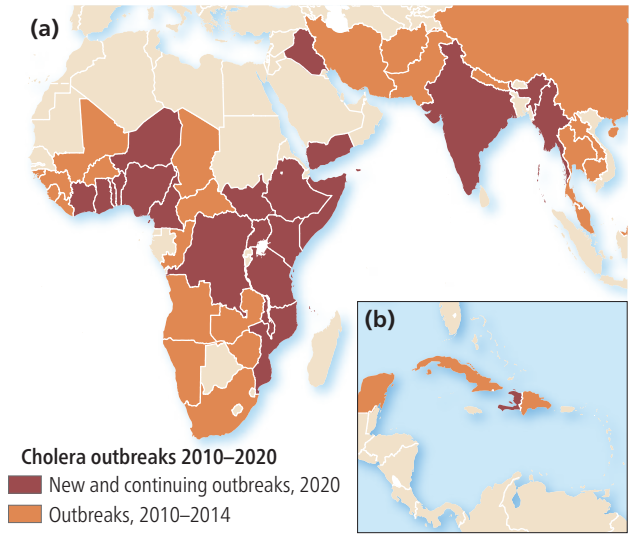
The overlay maps showed that cholera victims were not distributed uniformly through Soho, but rather were clustered around one pump on Broad Street. Tests at the Broad Street pump subsequently proved that the water there was contaminated by sewage. Those in London living in poverty were disproportionately affected by cholera because they were more likely to have to use contaminated water.

Death rates from cholera did not decline immediately during the Industrial Revolution. People looking for work crowded into rapidly growing industrial cities where cholera was able to spread rapidly and drive high death rates. Although uncommon in rural areas, cholera became a virulent epidemic in urban areas. It wasn't until the late nineteenth century, with the construction of water and sewer systems, that cholera was eradicated in Europe and North America.

Cholera persists today in several developing regions in stage 2 of the demographic transition, especially sub-Saharan Africa, Caribbean islands, and South and Southeast Asia, where many people lack access to clean drinking water (Figure 2-47).



▲ **FIGURE 2-46 STAGE 2 DISEASE 1854** Dr. John Snow's 1854 cholera map of London.



▲ **FIGURE 2-47 STAGE 2 DISEASE TODAY: CHOLERA** (a) Cholera in Africa & southern Asia; (b) Cholera in the Caribbean.

Stage 3: Degenerative Diseases

Stage 3 of the epidemiologic transition is characterized by a marked decrease in deaths from infectious diseases and an increase in chronic disorders associated with aging. The two especially important chronic disorders in stage 3 are cardiovascular diseases, such as heart attacks, and various forms of cancer. The global pattern of cancer is the opposite of that for stage 2 diseases; sub-Saharan Africa and South Asia have the lowest incidence of cancer, primarily because of the relatively low life expectancy in those regions (Figure 2-48).

Stage 4: Delayed Degenerative & Lifestyle Diseases

In 1986, Omran's epidemiologic transition was extended by sociologists S. Jay Olshansky and Brian Ault to stage 4, the stage of delayed degenerative diseases. In stage 4 of the epidemiologic transition, the major degenerative diseases that cause death – cardiovascular diseases and cancers – linger, but the life expectancy of people with degenerative disease is extended through medical advances. Through medicine, cancers spread more slowly or are removed altogether. Operations such as bypasses repair deficiencies in the cardiovascular system.

Some behavioral changes have improved health in stage 4 countries. These include better diet, reduced use of tobacco and alcohol, and more exercise. On the other hand, death rates have increased in stage 4 countries through use of prescription and illegal drugs, consumption of nonnutritious food, and sedentary behavior.

Increased deaths related to opioids have been especially challenging in stage 4 countries (Figure 2-49). As shown in Chapter 1, opioid-related deaths have not been distributed uniformly within the United States. Deaths are spatially associated with frequency of prescription of opioids.

Pause & Reflect 2.3.4 Why do pandemics decline during stage 2 of the demographic transition?

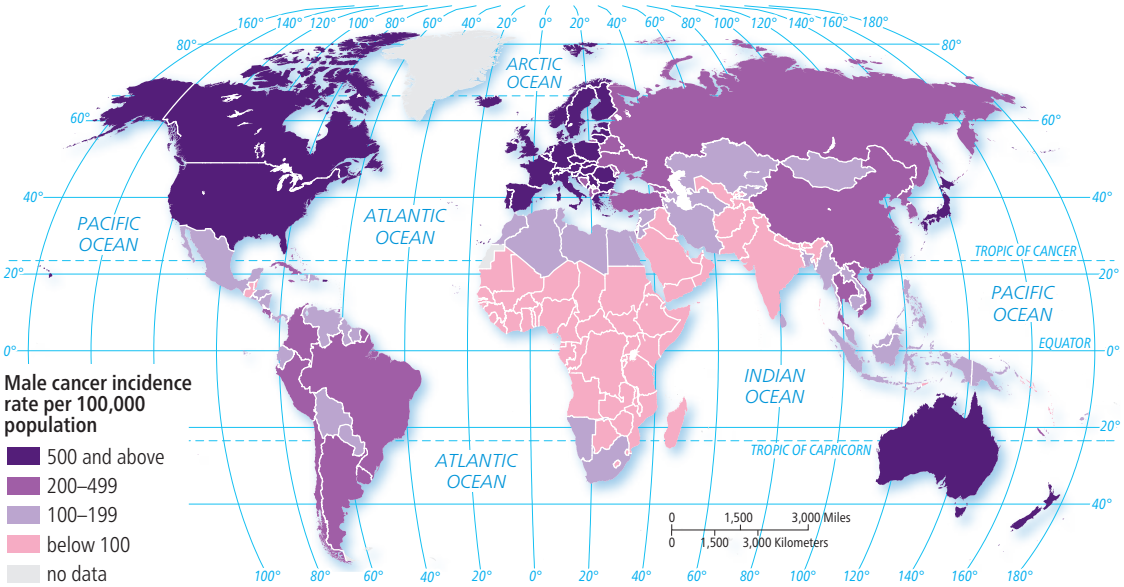


FIGURE 2-48 STAGE 3 DISEASE: MALE CANCER
Source: World Health Organization

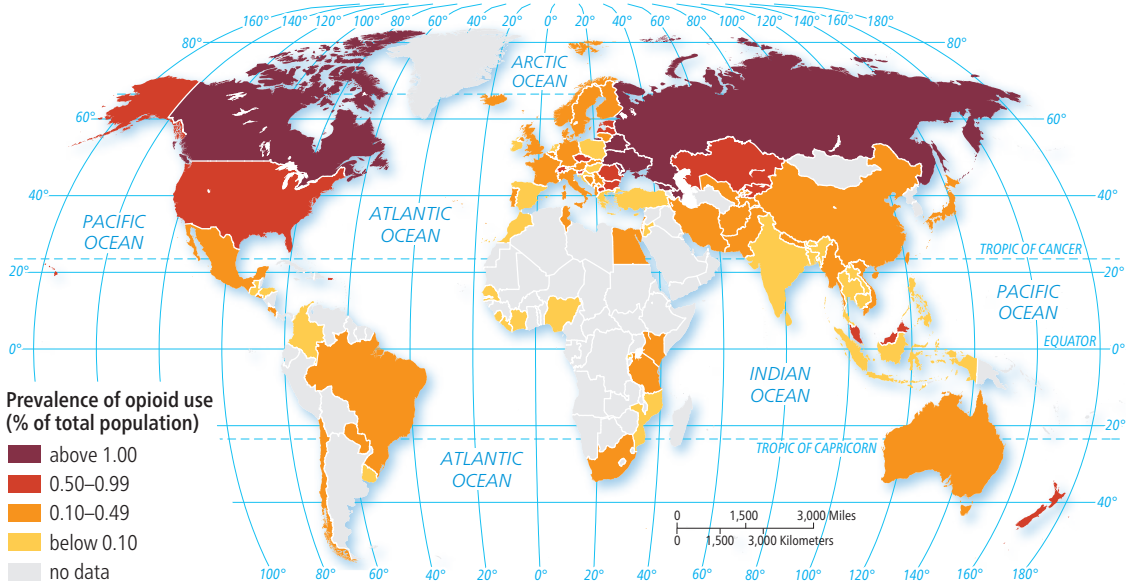


FIGURE 2-49 STAGE 4 DISEASE: OPIOIDS
Source: United Nations

KEY ISSUE

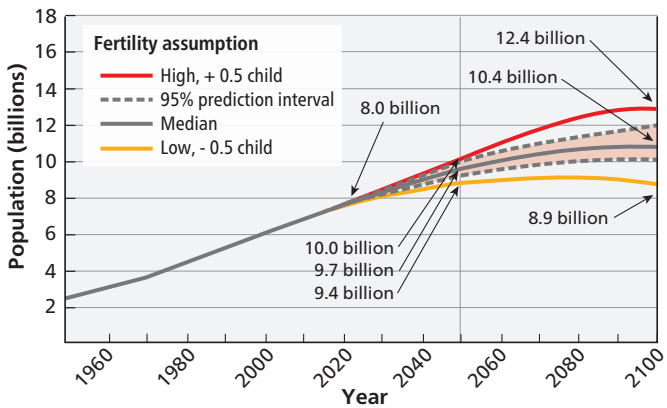
2.4 | Why Might Population Change in the Future?

Geographic concepts offer insights into future population and health trends. In view of the current size of Earth's population and the NIR, will there soon be too many of us? Or will Earth's total population stabilize and even decline in the future?

Population Futures

Learning Outcome 2.4.1 Assess a possible stage 5 of the demographic transition.

How many people will inhabit Earth in the future? Future population depends primarily on fertility. How many babies will women in the future bear in their lifetimes? Because future human behavior is unknowable, the U.N. has released what it believes to be three plausible scenarios. The middle estimate is that world population in 2100 will be 10.4 billion (Figure 2-50).



▲ **FIGURE 2-50 FUTURE POPULATION ESTIMATES**

Demographic Transition: Stage 5?

- Very low CBR
- Increasing CDR
- Declining NIR

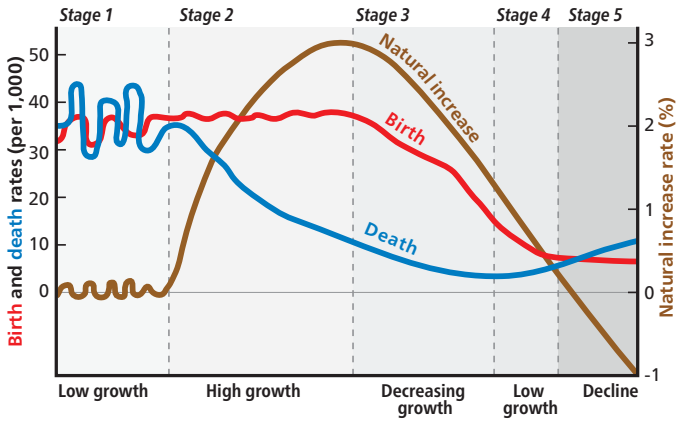
Demographers suggest a possible stage 5 of the demographic transition for some developed countries. Stage 5 would be characterized by a very low CBR, an increasing CDR, and therefore a negative NIR (Figure 2-51). After several decades of very low birth rates, a stage 5 country would have relatively few young women in childbearing years. If those women have fewer children than the number needed to maintain the population replacement rate, the CBR would fall lower than in stage 4.

Italy: Possible Stage 5

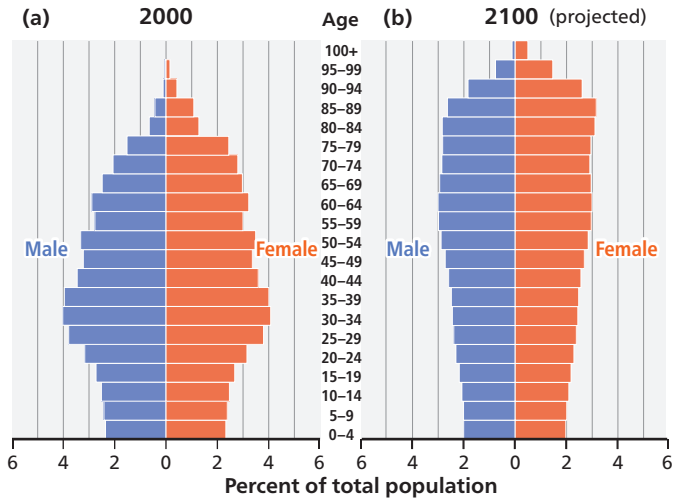
If the demographic transition is to include a stage 5, Italy will be one of the world's first countries to reach it. Italy's population hit a historic high of 63 million in 2015 and is now starting to decline, lowering to 59 million in 2022. Between 2010 and 2022, Italy's CBR declined from 10 to 7, while the CDR increased from 10 to 12. The U.N. forecasts Italy's population to fall to 40 million in 2100. With the population decline will come an increasing percentage of elderly people in the country (Figure 2-52).

Italy's population would have declined more rapidly were it not for immigration. The number of immigrants living in Italy increased from 1 million in 2000 to 6 million in 2021. The large increase in immigrants, combined with the negative NIR, has become a politically sensitive issue in Italy.

In addition to Italy, several European countries, notably Russia and other former communist countries, already have negative NIRs. Russia's high CDR and low CBR are a legacy of a half-century of communist rule under the former Union of Soviet Socialist Republics (U.S.S.R.). The low CBR in the former U.S.S.R. may stem from a long tradition of strong family-planning programs and a population with a deep-seated pessimism about having children in an uncertain world.



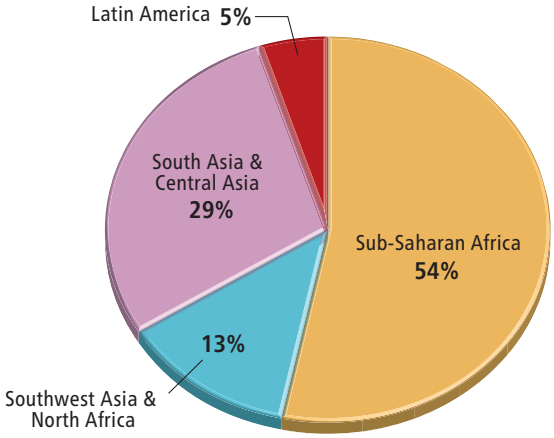
▲ **FIGURE 2-51 DEMOGRAPHIC TRANSITION WITH FIVE STAGES**



▲ **FIGURE 2-52 ITALY'S POPULATION PYRAMIDS** (a) 2000 (b) 2100.

Distribution of Population Growth

The U.N. forecasts that more than half of the world's entire population growth between now and 2050 will be in sub-Saharan Africa and most of the remainder will be in Asia (Figure 2-53). Only eight countries will account for more than half of the world's population increase between now and 2050. The eight countries include five in Africa (Democratic Republic of Congo, Egypt, Ethiopia, Nigeria, and Tanzania) and three in Asia (India, Pakistan, and the Philippines).



▲ **FIGURE 2-53 SHARE OF WORLD POPULATION GROWTH BY REGION, 2050 FORECAST** The U.N. forecasts that all of the world's population growth will be in the regions shown in the chart.

China's Population Policies

The world's two most populous countries, China and India, will heavily influence future prospects for global population. A **pronatalist policy** is a government policy that supports higher birth rates, whereas an **antinatalist policy** is one that supports lower birth rates. In recent decades, China and India have both instituted antinatalist policies with varying success. These two countries – together encompassing more than one-third of the world's population – have adopted different family-planning programs. As a result of less effective policies, India adds 10 million more people each year than does China.

China has made substantial progress in reducing its NIR. The core of the Chinese government's family planning program was the One Child Policy, adopted in 1980. Under the One Child Policy, a couple needed a permit to have a child. Couples received financial subsidies, a long maternity leave, better housing, and (in rural areas) more land if they agreed to have just one child. To discourage births, people received free contraceptives, abortions, and sterilizations. Rules were enforced with penalties by a government agency.

Largely as a result of the One Child Policy, China's CBR declined from 18 in 1980 to 8 in 2022, and consequently, the NIR declined from 1.2 to 0. China's CBR is now lower than that of the United States. The number of people added to China's population in a single year dropped from 14 million in 1980 to 964,000 in 2021. China's population declined by 10,000 in 2022.

With the U.N. now forecasting China to lose population in the coming years, the government replaced the One Child Policy with a Three Child Policy (Figure 2-54). But China's CBR is unlikely to increase much because, after three decades of intensive educational programs as well as coercion, most Chinese have accepted the benefits of family planning. As a result of preference for male children, there are fewer young women of childbearing years.

India's Population Policies

India was the first country to embark on a national family planning program, in 1952. The government established clinics, provided information about alternative methods of birth control, distributed free or low-cost birth control devices, and legalized abortions.

Most controversially, during the 1970s India set up camps to perform sterilizations – surgical procedures in which people were made incapable of reproduction. Widespread opposition to the sterilization program grew in the country because people feared that they would be forcibly sterilized, and it increased distrust of other family planning measures as well.

Government-sponsored family-planning programs in India now emphasize education, including advertisements on national radio and TV networks and information distributed through local health centers. Still, the dominant form of birth control in India continues to be sterilization of women, though in many cases after the women have already borne several children. Family planning measures lowered the CBR from 34 in 1980 to 20 in 2022, but India's population increased by 10 million in 2022, whereas China's population declined by 10,000, thus setting up India to surpass China in 2023 as the world's most populous country.

Pause & Reflect 2.4.1 Based on Italy's population pyramids, how might the potential support ratio change?

▲ **FIGURE 2-54 CHINA: WALL ART PROMOTES THREE CHILD POLICY EXTOLLING BENEFITS OF HAVING CHILDREN**

Family Futures

Learning Outcome 2.4.2 Describe two reasons for declining birth rates worldwide.

The CBR declined rapidly between 1990 and 2022, from 27 to 17 in the world as a whole and from 31 to 19 in developing countries. Declines have been most rapid in Latin America, Southwest Asia, and South Asia (Figure 2-55). The CBR has declined in all but a handful of countries (Figure 2-56).

Lowering CBR Through Education & Health Care

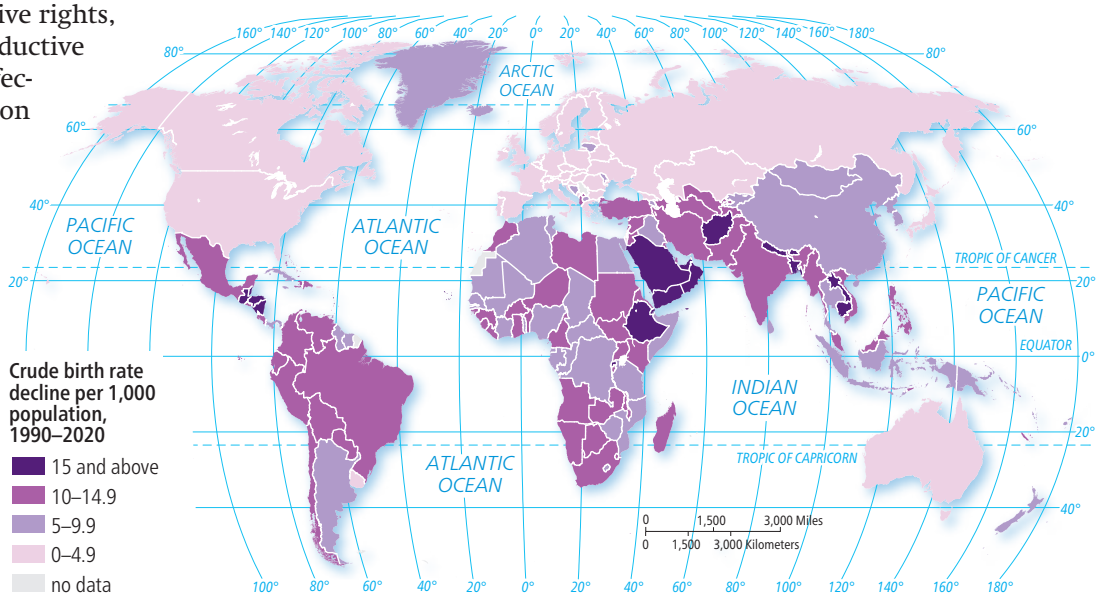
One approach to lowering birth rates emphasizes the importance of improving local economic conditions. A community with wealth has more money to spend on education and health-care programs that promote lower birth rates. Improving local economies results in the following:

- With more women able to attend school and to remain in school longer, they are more likely to learn employment skills and gain economic control over their lives.
- With better education, women are better able to understand their reproductive rights, make more informed reproductive choices, and select more effective methods of contraception (Figure 2-57).
- With improved health-care programs, IMRs decline through such programs as improved prenatal care, counseling about sexually transmitted diseases, and child immunization.
- With the survival of more infants ensured, women are more likely to choose to make more effective use of contraceptives for family-planning.

▲ **FIGURE 2-55 POSTER PROMOTES FAMILY PLANNING IN INDIA**

The U.N. Sustainable Development Goals, adopted in 2015, recognize that women's access to reproductive health care and education plays a key role in the overall quality of life for families (see Table 9-1).

Pause & Reflect 2.4.2 Why are birth rates since 1990 declining less rapidly in Europe and North America than in other regions?



▲ **FIGURE 2-56 CBR CHANGE 1990-2020** The CBR has declined in all but a handful of countries.
Source: Population Reference Bureau

◀ **FIGURE 2-57 FAMILY PLANNING EDUCATION** Women talk about birth control at a reproductive health clinic in Kampong Cham, Cambodia.

Lowering CBR Through Contraception

A second approach to lowering birth rates emphasizes the importance of rapidly diffusing modern contraceptive methods (Figure 2-58). In developing countries, demand for contraceptive devices is greater than the available supply. Therefore, the most effective way to increase contraceptive use is to distribute more contraceptives cheaply and quickly. Reducing world population is an important goal considering the availability of resources. Cultures can take a long time to change, so allocating resources into family-planning programs can reduce birth rates much more rapidly.

Rapid growth in the acceptance of family planning in a number of developing countries is evidence that, in the modern world, ideas can diffuse rapidly, even to places where people have limited access to education and modern communications. Bangladesh is an example of a country that has had little improvement in the wealth and literacy of its people, but 63 percent of married women in the country used contraceptives in 2022 compared to 6 percent in 1980. Similar growth in the use of contraceptives has occurred in other developing countries, including Colombia, Morocco, and Thailand.

Opposition to Family Planning

The percentage of couples practicing family planning is especially low in sub-Saharan African countries such as Nigeria (Figure 2-59). Only 33 percent of married women in sub-Saharan Africa practice a form of family planning in 2020, in part because of reluctance of men to use contraceptives.

Many throughout the world oppose birth control programs for religious and political reasons. Adherents of several religions have convictions that prevent them from using some or all birth-control methods. Opposition is especially strong in some countries to terminating pregnancy by abortion. In the United States, many states ban or severely restrict abortions, especially after the 2022 U.S. Supreme Court ruling *Dobbs v. Jackson Women's Health Organization* overturned *Roe v. Wade*, which had established the right to abortion in 1973.

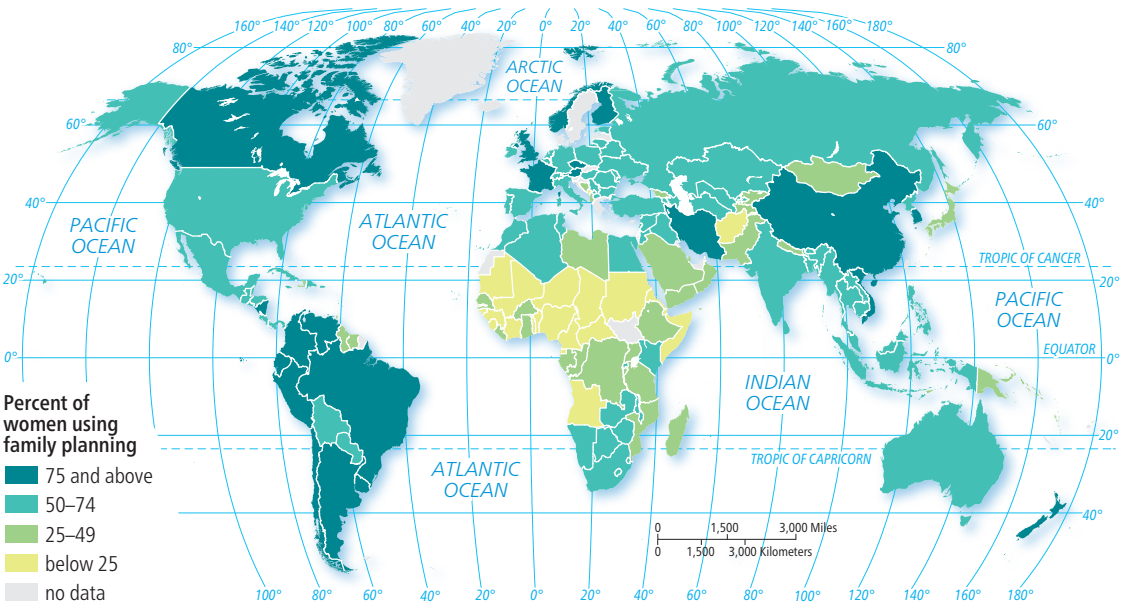


FIGURE 2-58 WOMEN USING FAMILY PLANNING More than two-thirds of couples in developed countries use a family planning method. Family planning varies widely in developing countries. China reports one of the world's highest rate of family planning, whereas the lowest rates are in sub-Saharan Africa.

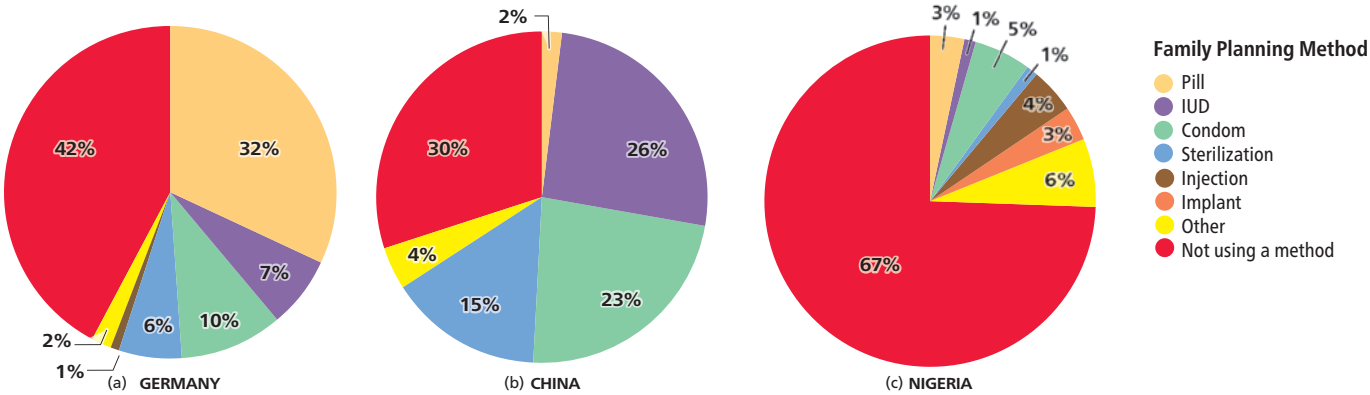


FIGURE 2-59 FAMILY PLANNING METHODS (a) The principal family-planning method in Germany is birth-control pills. (b) The principal methods in China are intrauterine devices (IUDs) and condoms. (c) People in sub-Saharan African countries such as Nigeria make minimal use of family planning.

Epidemiologic Futures

Learning Outcome 2.4.3 List reasons for a possible stage 5 of the epidemiologic transition.

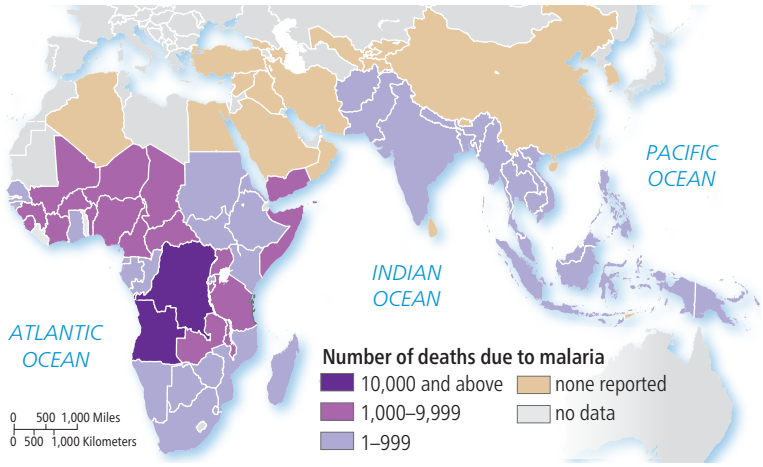
Recall that in a possible stage 5 of the demographic transition, CDR would rise because more of the population is elderly. Some medical analysts argue that the world is moving into stage 5 of the epidemiologic transition, brought about by a reemergence of infectious and parasitic diseases. Infectious diseases thought to have been eradicated or controlled have returned, and new ones have emerged. Other epidemiologists dismiss recent trends as a temporary setback in a long process of controlling infectious diseases.

Reason for Possible Stage 5: Evolution

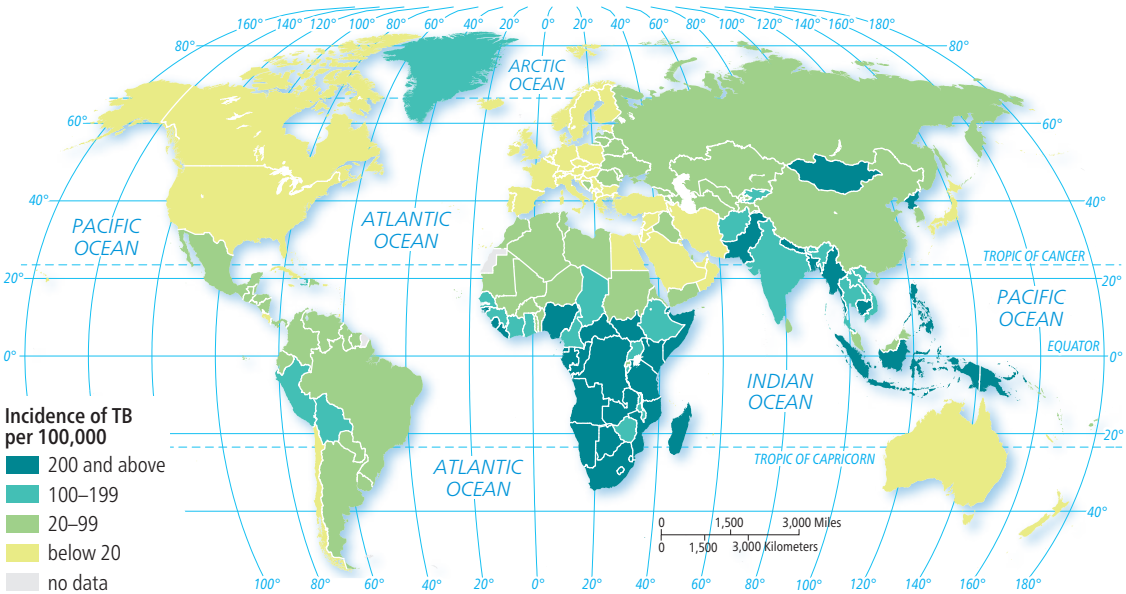
Three reasons help explain the possible emergence of a stage 5 of the epidemiologic transition: evolution, poverty, and diffusion. Infectious disease microbes have continuously evolved and changed in response to environmental pressures by developing resistance to drugs and insecticides. Antibiotics and genetic engineering contribute to the emergence of new strains of viruses and bacteria. Malaria was nearly eradicated in the mid-twentieth century by spraying DDT in areas infested with the mosquito that carried the parasite. However, malaria caused 627,000 deaths in 2020, nearly all in sub-Saharan Africa (Figure 2-60). A major reason is the evolution of DDT-resistant mosquitoes.

Reason for Possible Stage 5: Poverty

Infectious diseases are more prevalent in areas of poverty than other places because unsanitary conditions may persist and most people can't afford the drugs needed for treatment. Tuberculosis (TB) is an example of an infectious disease that has been largely controlled in developed countries but remains a major cause of death in developing countries (Figure 2-61). An airborne disease that damages the lungs, TB (often called "consumption") spreads principally through coughing and sneezing. TB is more prevalent in areas of low economic means because the long, expensive treatment poses a significant economic burden. People with immune systems compromised by poor nutrition or HIV infection are especially susceptible to TB.



▲ **FIGURE 2-60 EVOLUTION: MALARIA DEATHS** Malaria is found primarily in tropical regions of developing countries.
Source: World Health Organization



◀ **FIGURE 2-61 POVERTY: INCIDENCE OF TB** Deaths from TB are found primarily in developing countries unable to pay for the expensive treatment.
Source: World Health Organization

Reason for Possible Stage 5: Increased Connections

Pandemics have spread in recent decades through the process of relocation diffusion, discussed in Chapter 1. As they travel, people carry diseases with them and are exposed to the diseases of others.

The most lethal pandemic in recent years – even greater than COVID-19 – has been acquired immunodeficiency syndrome (AIDS). Worldwide, 40 million people died from AIDS-related illnesses from the start of the epidemic in 1981 through 2021, and 38 million were living with human immunodeficiency virus (HIV, the cause of AIDS) in 2021. The impact of AIDS has been felt most strongly in sub-Saharan Africa, home to around three-fourths of the world's AIDS victims and current HIV-positive people (Figure 2-62).

Diffusion of HIV/AIDS in the United States

HIV diffused from sub-Saharan Africa through relocation diffusion, both by Africans and by visitors to Africa returning to their home countries. HIV entered the United States during the early 1980s through New York, California, and Florida. Not by coincidence, the three leading U.S. airports for international arrivals are in these three states (Figure 2-63). Though HIV diffused to every state during the 1980s, these three states, plus Texas (a major port of entry by motor vehicle), accounted for half the country's new HIV diagnoses in the peak year of 1993.

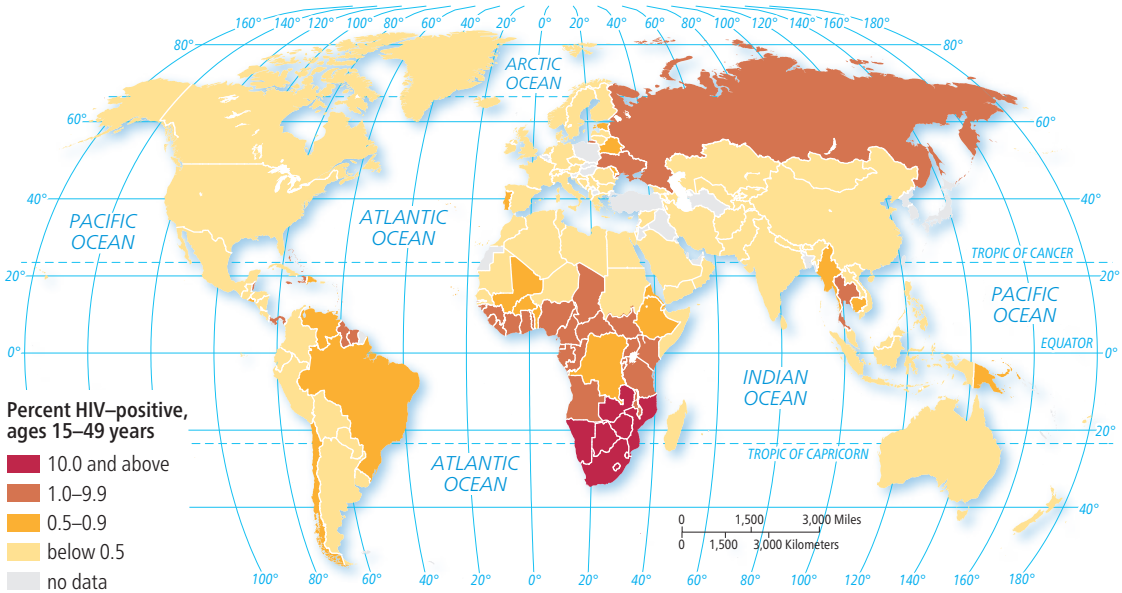
The number of people newly diagnosed with HIV has dropped sharply since the late 1990s because of the rapid diffusion of preventive methods and medicines. The rapid spread of these innovations is an example of expansion diffusion rather than relocation diffusion (see Chapter 1).

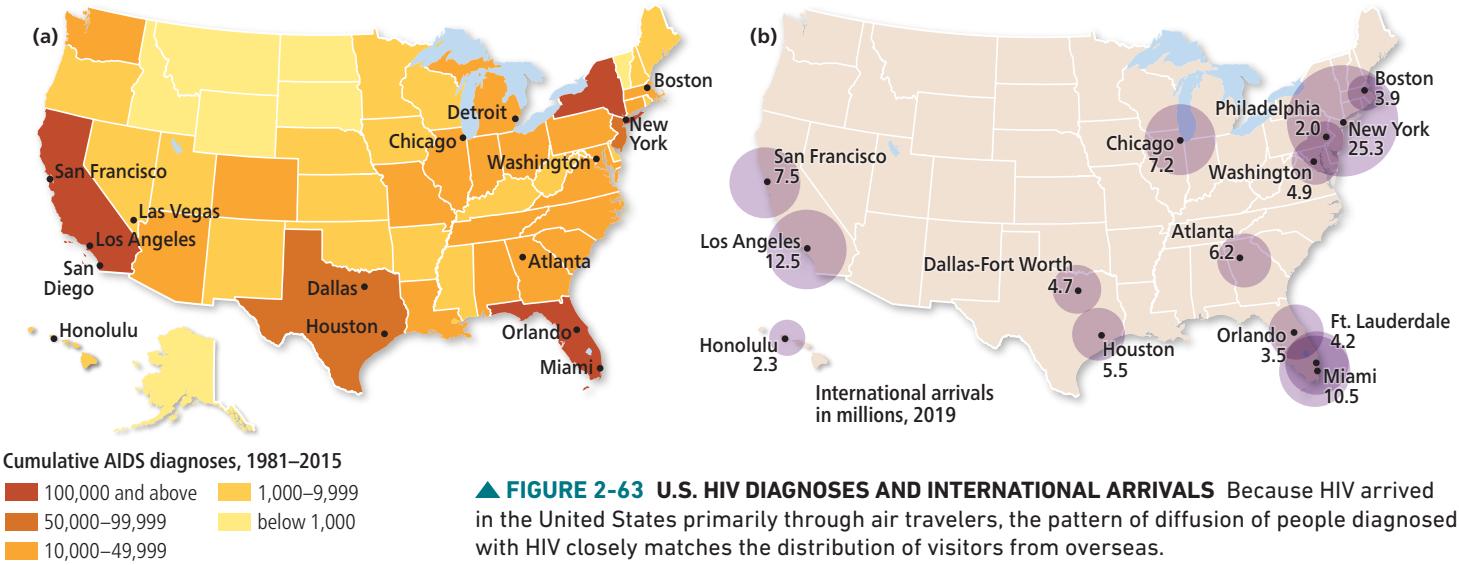
Most people newly diagnosed as HIV-positive are found in large urban areas. However, as a percentage of total population, southern states, led by Louisiana and Georgia, now have the largest rate of new HIV-positive diagnoses. Male-to-male sexual contact remains the principal form of diffusion in the United States.

Pause & Reflect 2.4.3 Which region within the United States has the lowest number of HIV-positive diagnoses? What geographic factor might account for this low level?

▼ **FIGURE 2-62 PERCENT OF POPULATION DIAGNOSED AS HIV-POSITIVE**

Source: CIA World Factbook





▲ **FIGURE 2-63 U.S. HIV DIAGNOSES AND INTERNATIONAL ARRIVALS** Because HIV arrived in the United States primarily through air travelers, the pattern of diffusion of people diagnosed with HIV closely matches the distribution of visitors from overseas.

Population & Resources

Learning Outcome 2.4.4 Explain arguments for and against Malthus's theory.

British economist Thomas Malthus (1766–1834) was one of the first to argue that the world's rate of population increase was far outrunning the development of food supplies. In *An Essay on the Principle of Population*, published in 1798, Malthus claimed that the population was growing much more rapidly than Earth's food supply because population increased geometrically, whereas food supply increased arithmetically (Figure 2-64). According to Malthus, these growth rates would produce the following relationships between people and food in the future:

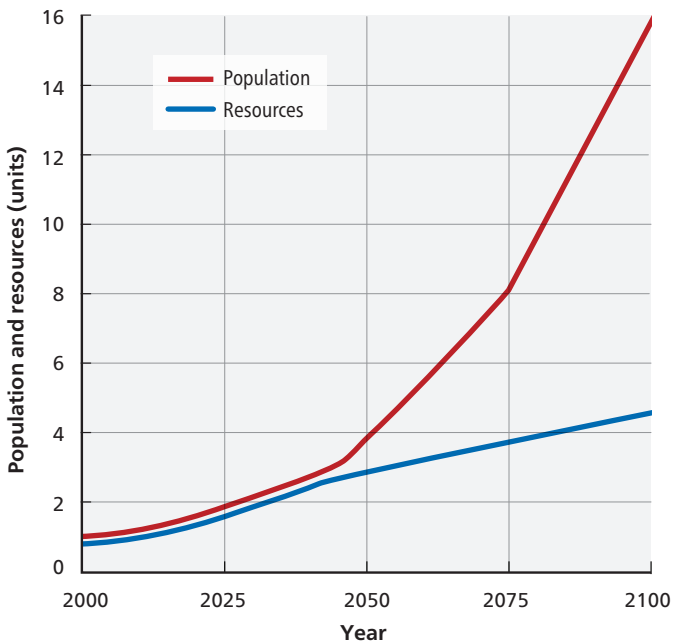
Today:	1 person, 1 unit of food.
25 years from now:	2 persons, 2 units of food.
50 years from now:	4 persons, 3 units of food.
75 years from now:	8 persons, 4 units of food.
100 years from now:	16 persons, 5 units of food.

Malthus's theory remains influential today. Some geographers and other so-called neo-Malthusians are taking another look at Malthus's views because world population growth is outstripping a wide variety of resources, if not food. Some neo-Malthusians argue that frightening pandemics like COVID-19 will result in higher death rates and lower birth rates. According to neo-Malthusians, organisms will evolve resistance to pesticides and vaccines, antibiotics will eventually lose their effectiveness (wear off), and new viral and bacterial strains will evolve that cannot be controlled.

Malthus's Critics

Criticism has been leveled at both the population and food supply sides of Malthus's theory. Many geographers consider Malthus's theory unrealistically pessimistic because it is based on a belief that the world's supply of resources is fixed rather than expanding.

Critics also argue that population growth is not a problem. To the contrary, they think that a larger population could stimulate economic growth and therefore production of more food. Marxist economists argue that poverty and hunger are a result of an unjust society and economic inequality, not population growth, and that the world possesses sufficient resources to eliminate hunger and poverty if these resources are shared equally.

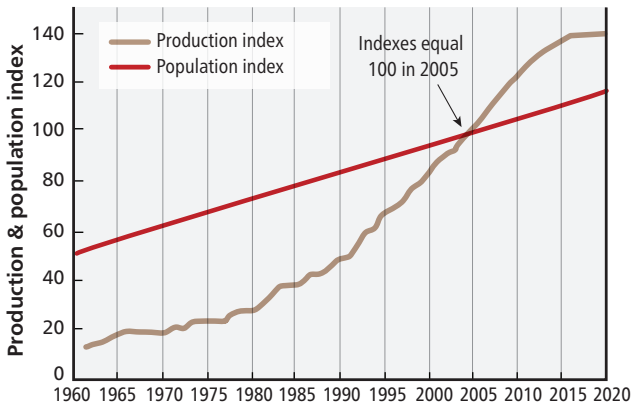


▲ **FIGURE 2-64 MALTHUS'S THEORY** Malthus expected population to grow more rapidly than food supply.

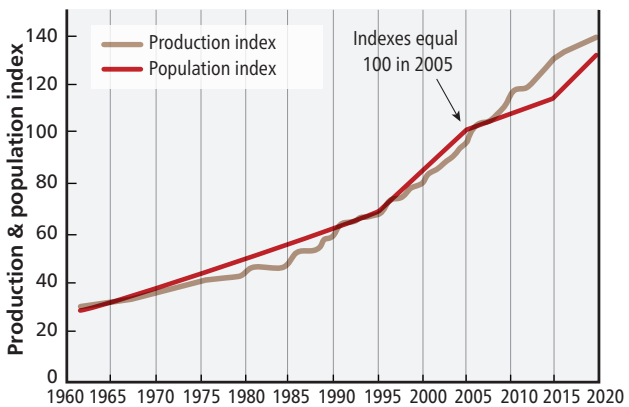
Malthus's Theory & the Reality of Population Growth

Evidence from the past half-century lends support to both neo-Malthusians and their critics. Malthus was fairly close to the mark on food supply but much too pessimistic on population growth. In contrast with Malthus's theory, food production has increased during the last half-century in China more rapidly than its population (Figure 2-65). Better growing techniques, higher-yielding seeds, and cultivation of more land have contributed to the expansion of the food supply (see Chapter 10). On the other hand, the food supply has barely kept up with population growth in Africa (Figure 2-66).

Pause & Reflect 2.4.4 Calculate the units of population and food that Malthus predicted would exist in 200 years.



▲ **FIGURE 2-65 FOOD PRODUCTION AND POPULATION: CHINA**



▲ **FIGURE 2-66 FOOD PRODUCTION AND POPULATION: AFRICA**

Population, Resources, & COVID-19

COVID-19 is the most significant pandemic to spread around the world in recent decades through relocation diffusion. As they travel, people have carried COVID-19 around the world.

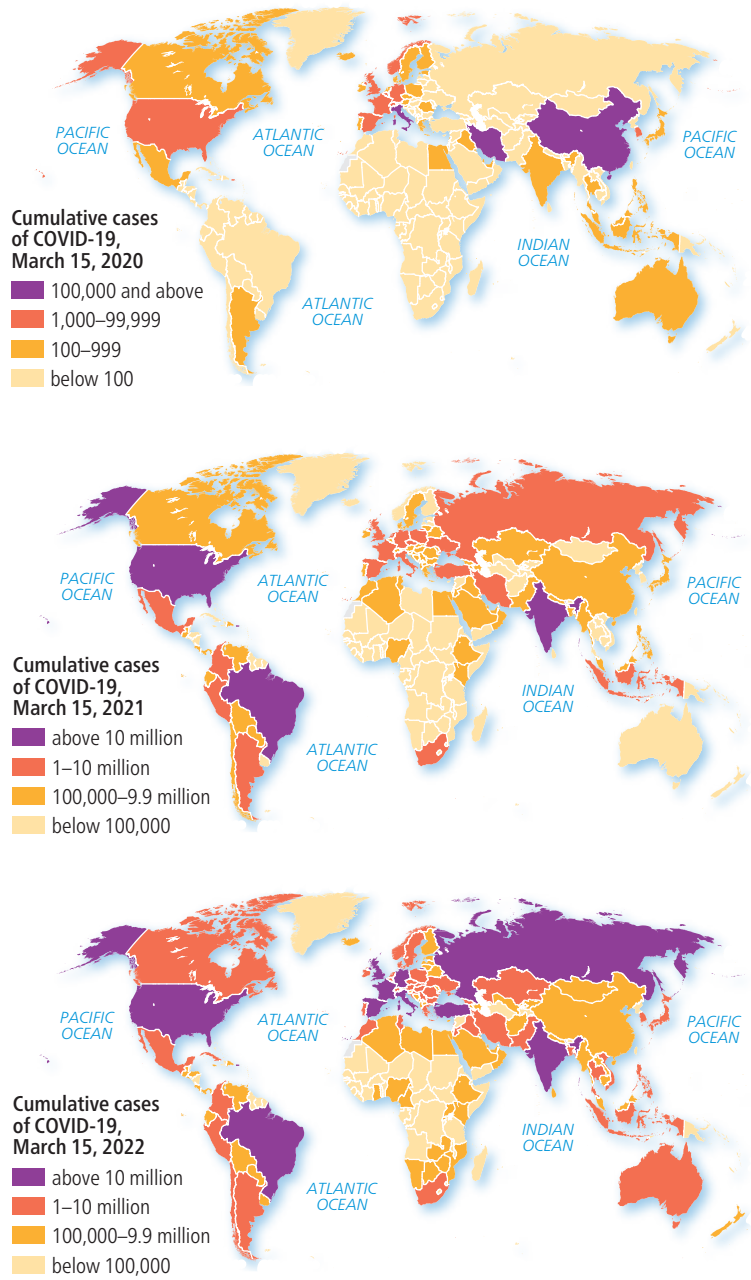
COVID-19 was first identified in China in December 2019 (see Chapter 1). From there, the virus was carried through movement of people to other countries. The virus diffused first to Europe and then to North America (Figure 2-67). Worldwide, around 700 million people had COVID-19 by the end of 2022, and 6.7 million had died of the disease as of that date.

Global Distribution of COVID-19

The COVID-19 pandemic has been especially severe in developed countries. Europe and North America, with only 14 percent of the world's population, have 40 percent of the world's COVID-19 fatalities.

Several explanations have been offered for the relatively small number of COVID-19 cases in Africa. With many African countries in stage 2 of the demographic transition, the percentage of younger people is relatively high, and these younger people may be less susceptible to catching the disease.

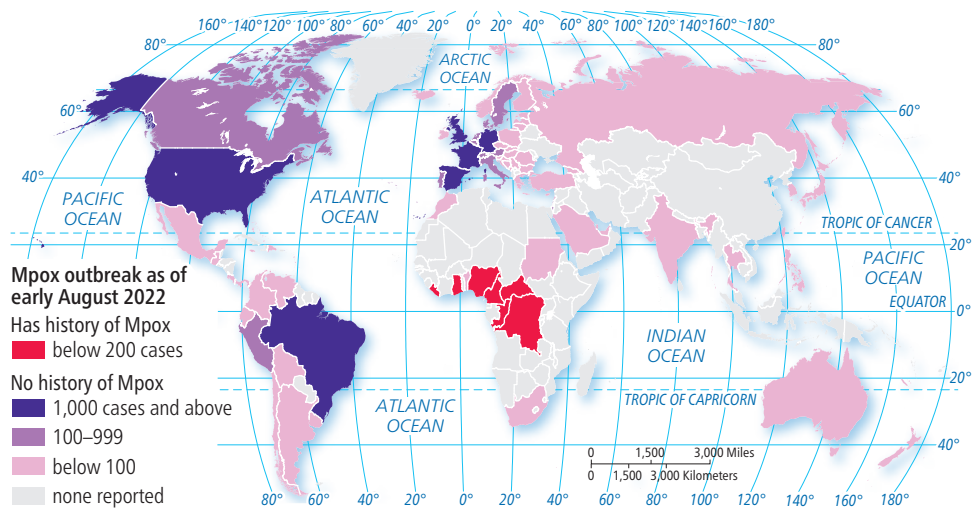
To prevent diffusion of the disease, drastic measures were taken in several African countries. For example, Lesotho closed its borders even before it had recorded a single case. Compliance with measures to prevent spread of the disease, such as wearing masks and avoiding large gatherings, may have been higher in African countries than in Europe and North America. On the other hand, some epidemiologists contend that Africa has had rates of COVID-19 comparable to developed countries, but poor testing and inadequate health-care systems in developing countries may have kept many cases from being recorded.



▲ **FIGURE 2-67 COVID-19 DIFFUSION**

Global Distribution of Mpox

The mpox virus is also diffusing through relocation diffusion, primarily to developed countries of North America and Europe (Figure 2-68). Mpox (originally known as monkeypox) is spreading mostly through close, intimate contact with someone who has mpox. Within the United States, the earliest cases of mpox followed the patterns of HIV and COVID-19, with clusters in New York and other principal centers for international arrivals (refer to Figures 2-63 and 1-20).



▲ **FIGURE 2-68 MPOX CASES** As of August 2022.

2 Summary & Review

KEY ISSUE

2.1 | Where Are People Distributed?

- The world's population is highly clustered in four regions: East Asia, South Asia, Southeast Asia, and Europe.
- The physical environment discourages population concentrations in some regions.
- Arithmetic, physiological, and agricultural densities represent population distribution in different ways.

KEY ISSUE

2.2 | Why Is Population Increasing?

- The natural increase rate measures population growth as the difference between births and deaths.
- The crude birth and crude death rates are the principal measures of population change in a society as a whole.
- The demographic transition has four stages characterized by varying rates of births, deaths, and natural increase.

KEY ISSUE

2.3 | Why Does Health Vary by Region?

- The percentage of younger and older people varies among countries and impacts the dependency ratio.
- Because of gender-based sex selection, baby girls and mothers face challenging health risks, especially in developing countries.
- Health care and medical facilities vary sharply between developed and developing countries.

KEY ISSUE

2.4 | Why Might Population Change in the Future?

- Neo-Malthusians argue that population is outstripping resources, but others do not agree.
- The demographic transition may display a possible stage 5 of population decline.
- Birth rates have declined through the use of two strategies.

Thinking Geographically

KEY ISSUE

2.1 | Where Are People Distributed?

Human beings are highly clustered. Scientists disagree about the effects of high clustering on human behavior. Some laboratory tests show that rats display evidence of increased aggressiveness, competition, and violence when very large numbers are placed in a box. Might living in a highly clustered place, such as São Paulo, cause people to behave especially aggressively or violently? Why or why not?

▶ **FIGURE 2CR-1 SÃO PAULO, BRAZIL**

KEY ISSUE

2.2 | Why Is Population Increasing?

▲ **FIGURE 2CR-2 BOOMERS AND GEN Z**

The United States and other stage 3 and stage 4 countries have relatively large numbers of boomers (born 1946-1964). Compared with their parents' generation, boomers received more education and women were more likely to work outside the home. Boomers married later (if at all) and were more likely to cohabit. They had few children and more children while unmarried. In what ways do you think the Gen Z generation (born after 1995) might display demographic characteristics similar to or different from those of boomers? Why?

KEY ISSUE

2.3 | Why Does Health Vary by Region?

Health care varies widely around the world. Health-care indicators for the United States do not always match those of other countries. What reasons might explain these differences?

▲ **FIGURE 2CR-3 FREE DENTAL CLINIC, JACKSONVILLE, FLORIDA**

KEY ISSUE

2.4 | Why Might Population Change in the Future?

Although authorities on demography such as the Population Reference Bureau (PRB) and the U.N. Population Fund still prefer the four-stage model of the demographic transition, some geographers believe that the demographic transition now has a fifth stage in places such as Japan. What sort of evidence might help determine the existence of a possible stage 5?

▲ **FIGURE 2CR-4 JAPAN: POSSIBLE STAGE 5** Enjoying cherry blossoms, Tokyo, Japan.

Key Terms

Agricultural density The ratio of the number of farmers to the total amount of arable land.

Antinatalist policy Government policy that supports lower birth rates.

Arable land Land suited for agriculture.

Arithmetic density The total number of people divided by the total land area.

Carrying capacity The maximum population size of a species that the environment can sustain indefinitely, given the available resources.

Crude birth rate (CBR) The total number of live births in a year for every 1,000 people alive in the society.

Crude death rate (CDR) The total number of deaths in a year for every 1,000 people alive in the society.

Demographic transition The process of change in a society's population from a condition of high crude birth and death rates and low rate of natural increase to a condition of low crude birth and death rates, low rate of natural increase, and higher total population.

Demography The scientific study of population characteristics.

Dependency ratio The number of people under age 15 and age 65 and over compared to the number of people active in the labor force.

Doubling time The number of years needed to double a population, assuming a constant rate of natural increase.

Ecumene The portion of Earth's surface occupied by permanent human settlement.

Epidemic A widespread occurrence of an infectious disease in a community at a particular time.

Epidemiologic transition The process of change based on the distinctive causes of death in a population at each stage of the demographic transition.

Epidemiology The branch of medical science concerned with the incidence, distribution, and control of diseases that are prevalent among a population at a specific time and are produced by some unique causes not generally present in the affected locality.

Industrial Revolution A series of improvements in machine-driven technology that transformed the process of manufacturing goods.

Infant mortality rate (IMR) The total number of deaths in a year among infants under 1 year of age for every 1,000 live births in a society.

Life expectancy The average number of years an individual can be expected to live, given current social, economic, and medical conditions. Life expectancy at birth is the average number of years a newborn infant can expect to live.

Maternal mortality rate The annual number of female deaths per 100,000 live births from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes).

Medical revolution Health diagnostic and disease treatment technology invented in Europe and North America that has diffused to the developing countries in Latin America, Asia, and Africa. Improved medical practices have eliminated many of the traditional causes of death in developing countries and enabled more people to live longer and healthier lives.

Natural increase rate (NIR) The percentage growth of a population in a year, computed as the crude birth rate minus the crude death rate.

Overpopulation A situation in which the number of people in an area exceeds the capacity of the environment to support life at a decent standard of living.

Pandemic An epidemic that occurs over a wide geographic area and affects a very high proportion of the population at the same time.

Physiological density The number of people per unit area of arable land.

Population pyramid A bar graph that represents the distribution of population by age and sex.

Potential support ratio (or **elderly support ratio)** The number of working-age people (ages 15 to 64) divided by the number of persons 65 and older.

Pronatalist policy Government policy that supports higher birth rates.

Sex ratio The number of males per 100 females in the population.

Total fertility rate (TFR) The average number of children a woman will have throughout her childbearing years.

Zero population growth A decline of the total fertility rate to the point where the natural increase rate equals zero.

International Geographic Mapping Explorations

Density, Concentration, & Pattern in Egypt

Distribution (defined in Chapter 1) is the arrangement of a feature in space. A feature has three main distribution properties: density, concentration, and pattern. Egypt's population density is about average among the countries of the world. Its population is very highly clustered; 97 percent of Egyptians live on just 8 percent of the land. The pattern of Egypt's population is linear; the reason is that nearly all Egyptians live very close to the Nile River (Figure 2CR-5).

▲ **FIGURE 2CR-5 NILE RIVER NEAR NAGEL GULAB, EGYPT**

. . . . The population of an individual country or region changes through a combination of natural increase and migration. As the natural increase rate declines in most places, population change is increasingly influenced by the number of people migrating out of some places and into other places, as we will see in the next chapter Migration. . . .

3 Migration

KEY ISSUES

3.1 Where Are Migrants Distributed?

People emigrate from some places and immigrate to other places. The United States has long been an especially popular destination for migrants.

3.2 Where Do People Migrate Within Countries?

Large countries may have extensive migration between regions. Migration is also important within regions of countries, especially from rural areas into urban areas.

3.3 Why Do People Migrate?

People migrate for political, environmental, and economic reasons. Women and children comprise increasing shares of migrants.

3.4 Why Do Migrants Face Challenges?

People often face legal restrictions on their ability to immigrate into another country. In some places, they also face hostility from people already residing there.

▶ Refugees from Ukraine arrive at the Poland border.

Migration is the permanent move to a new location. Geographers study migration in part because it is increasingly important in explaining changes in population in various places and regions. Understanding migration patterns is vital because, when people migrate, they bring their cultural values and economic practices with them. At the same time, they become connected with the cultural and economic patterns of their new place of residence.

LOCATIONS EXPLORED IN THIS CHAPTER

KEY ISSUE

3.1 | Where Are Migrants Distributed?

Refer back to Figure 2-5 (ecumene) for a moment. Humans have spread across Earth during the past 7,000 years. This diffusion of human settlement from a small portion of Earth's land area to most of it resulted from migration. To accomplish the spread across Earth, humans have permanently changed their place of residence—where they sleep, store their possessions, and practice their customs with family and friends.

FIGURE 3-2 **CIRCULATION** Moving into a university residence hall.

Migration & Geography

Learning Outcome 3.1.1 Explain the concept of migration and how it is measured by geographers.

Migration is a permanent move to a new location. Geographers document the migration of people across Earth as well as reasons for the migration. Migration is a specific type of relocation diffusion, which was defined in Chapter 1 as the spread of a characteristic through the physical movement of people from one place to another.

Geographers study migration in part because it is important in explaining changes in population in various places and regions. Migration is also important because when people migrate, they take with them to their new home cultural values and economic practices.

Migration is a form of **mobility**, which is a more general term covering all types of movements from one place to another. People display mobility in a variety of ways, such as by journeying every weekday from their homes to places of work or education and once a week to shops, places of worship, or recreation areas (Figure 3-1). These types of short-term, repetitive, or cyclical movements that recur on a regular basis, such as daily, monthly, or annually, are called **circulation**. College students display another form of circulation – seasonal mobility – by moving to a residence hall each fall and returning home the following spring (Figure 3-2).

FIGURE 3-1 **MOBILITY** Off to school.

Geographers are especially interested in why people migrate, even though migration occurs much less frequently than other forms of mobility because it produces profound changes for individuals and entire cultures (Figure 3-3). A permanent move to a new location disrupts traditional cultural ties and economic patterns in one region. At the same time, when people migrate, they take with them to their new home their language, religion, ethnicity, and other cultural traits as well as their methods of farming and other economic practices.

Why would people make a perilous journey across thousands of kilometers of ocean? Why did the pioneers cross the Great Plains, the Rocky Mountains, and the Mojave Desert to reach the American West? Why do people continue to migrate by the millions today despite the hardships of doing so? The hazards that many migrants have faced are a measure of the strong lure of new locations and the desperate conditions in their former homelands. Most people migrate in search of three objectives: economic opportunity, cultural freedom, and environmental comfort. This chapter will examine where people migrate and the reasons why people migrate.

The changing scale generated by modern transportation systems, especially motor vehicles and airplanes, makes relocation diffusion, which includes migration, more feasible than in the past, when people had to rely on walking, animal power, or slow ships. However, thanks to modern communications systems, relocation diffusion is no longer essential for transmittal of ideas from one place to another. Culture and economy can diffuse rapidly around the world through forms of expansion diffusion.

FIGURE 3-3 **WHY PEOPLE MOVE** Man traveling by foot, looking for work in 1938, during the Great Depression.

Immigration & Emigration

The flow of migration always involves two-way connections. Given two locations, A and B, some people migrate from A to B, while at the same time, others migrate from B to A. **Emigration** is migration from a location; **immigration** is migration to a location.

The difference between the number of immigrants and the number of emigrants is the **net migration**. If the number of immigrants exceeds the number of emigrants, the net migration is positive, and the region has net in-migration. If the number of emigrants exceeds the number of immigrants, the net migration is negative, and the region has net out-migration.

Figure 3-4 summarizes the origin and destination of international migrants between 1990 and 2020. In 2020, 281 million of the world's 7.8 billion people were living outside their country of birth. The largest number came from Asia, and the largest numbers went to Asia or Europe. North America, Europe, and the South Pacific have more immigrants than emigrants, whereas Africa, Asia, and Latin America have more emigrants than immigrants.

Global Pattern of Migration

About 4 percent of the world's people are international migrants – that is, they currently live in countries other than the ones in which they were born (Figure 3-5). The United States has more foreign-born residents than any other country, approximately 47 million as of 2022, a number that is growing annually by around 1 million. Germany is a distant second with 16 million immigrants. Australia and Canada, which are much less populous than the United States, have higher rates of net in-migration. The highest in-migration rates of all are in petroleum exporting countries of Southwest Asia, including Saudi Arabia, which attract immigrants primarily from other countries in Asia to perform many of the dirty and dangerous functions in the oil fields and construction.

Pause & Reflect 3.1.1 Do the developed regions of Europe and North America appear in Figure 3-4 to have net in-migration or net out-migration?

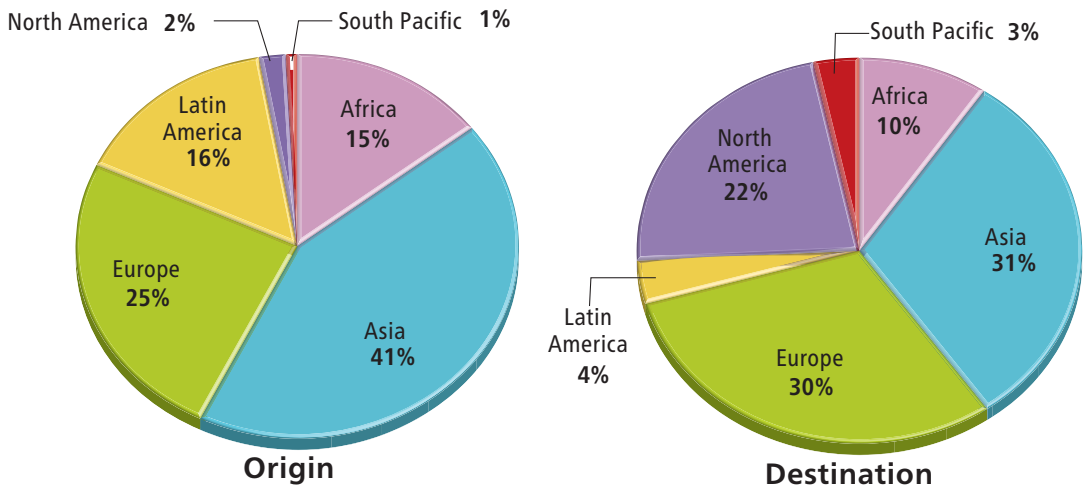


FIGURE 3-4 SHARE OF IMMIGRANTS AND EMIGRANTS, 1990–2020

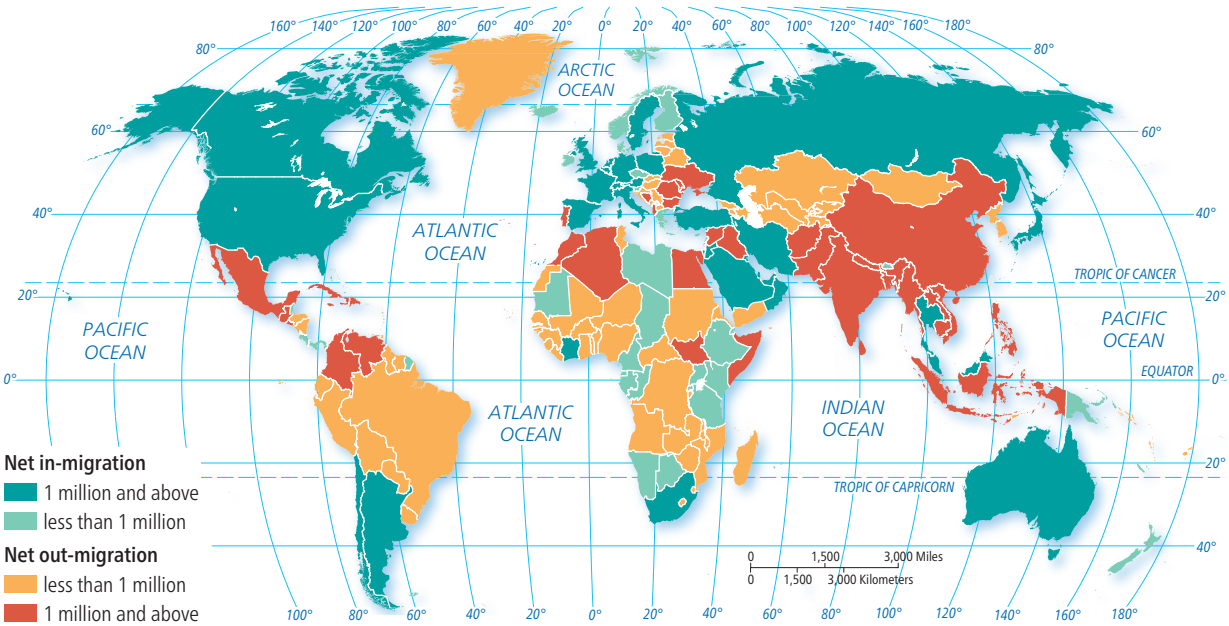


FIGURE 3-5 GLOBAL MIGRATION PATTERNS, 2022

International & Internal Migration

Learning Outcome 3.1.2 Recognize the principal streams of international and internal migration.

Migration occurs at two principal scales – international migration and internal migration.

International Migration

A permanent move from one country another is **international migration**. International migration is further divided into two types:

- **Voluntary migration** means that the migrant has chosen to move, usually for economic reasons, though sometimes for environmental reasons (Figure 3-6).
- **Forced migration** means that the migrant has been compelled to move by political or environmental factors (Figure 3-7).

◀ **FIGURE 3-6 VOLUNTARY MIGRATION** Husband and wife are reunited.

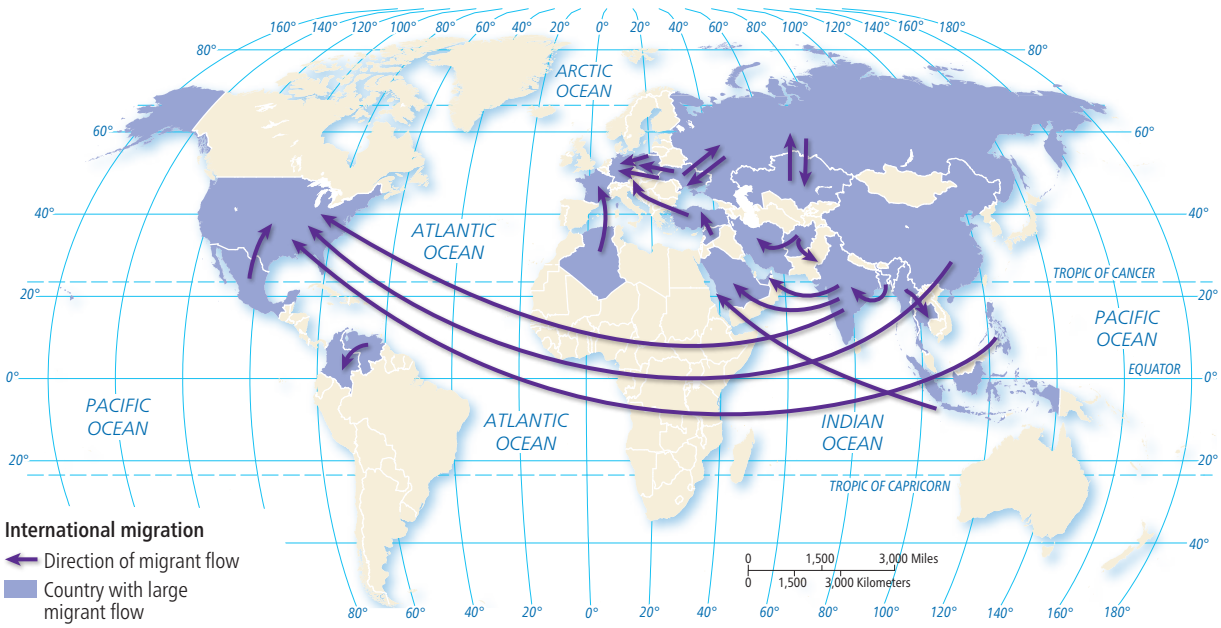
▲ **FIGURE 3-7 FORCED MIGRATION** Ukrainian mother and child cross into Poland after Russia's invasion of Ukraine in 2022.

The distinction between forced and voluntary migration is not clear-cut. Those who migrate for economic reasons may be motivated to seek a better life for themselves and their families through improved access to jobs and food. They have not been explicitly compelled to migrate by the violent actions of other people.

At a global scale, the three largest flows of migrants are (Figure 3-8):

- From Latin America to North America.
- From Asia to Europe.
- From Asia to North America.

The global pattern reflects the importance of migration from developing countries to developed countries. Asia, Latin America, and Africa have net out-migration, and North America, Europe, and the South Pacific have net in-migration. Migrants from countries with relatively low incomes and high natural increase rates (refer to Chapter 2) head for developed countries, where job prospects are brighter.



◀ **FIGURE 3-8 LARGEST COUNTRY-TO-COUNTRY MIGRATION FLOWS, 2020**

Internal Migration

A permanent move within the same country is **internal migration**. Consistent with the distance-decay concept presented in Chapter 1, the farther away a place is located, the less likely it is that people will migrate to it. Furthermore, in contrast with international migration, most countries permit people to migrate internally (Figure 3-9). Thus, internal migrants are much more numerous than international migrants.

Internal migration can be divided into two types:

- **Interregional migration** is movement from one region of a country to another. Historically, the main type of interregional migration has been from rural to urban areas in search of jobs. In Mexico, for example, migrants have been heading from the south to the north to look for jobs in businesses located relatively close to the U.S. border (Figure 3-10).
- **Intraregional migration** is movement within one region. The main type of intraregional migration has been within urban areas, from older cities to newer suburbs. Migration to suburban areas can be observed in both developed countries and developing countries. For example, the largest migration flow in Mexico is from Mexico City to surrounding suburbs.

Most people find migration within a country less traumatic than international migration because they find familiar language, foods, broadcasts, literature, music, and other social customs after they move. Moves within a country also generally involve much shorter distances than those in international migration. However, internal migration can involve long-distance moves in large countries, such as in the United States and Russia.

Pause & Reflect 3.1.2 Reflect on a story of migration that is personal to you. Was it voluntary international, forced international, internal interregional, or internal intraregional?

FIGURE 3-9 INTERNATIONAL AND INTERNAL MIGRATION Mexico's two principal patterns of international migration are net in-migration from Central America and net out-migration to the United States. Mexico's two principal interregional migration flows are net migration from the south to the north and from the center to the north. Mexico's principal intraregional migration flow is from Mexico City to outer states in the Mexico City metropolitan area.

FIGURE 3-10 INTERNATIONAL AND INTERNAL MIGRATION: MEXICO Immigrants to Mexico from Honduras have migrated north to Tijuana, where they meet with potential employers.

Changing U.S. Immigration

Learning Outcome 3.1.3 Describe the changing places of origin of U.S. immigrants.

The United States plays a special role in the study of international migration. The world's third-most populous country – the United States – is inhabited overwhelmingly by direct descendants of immigrants. About 80 million people migrated to the United States between 1820 and 2022, including 47 million who were alive in 2022.

The United States has had three main eras of immigration:

- Colonial settlement in the seventeenth and eighteenth centuries.
- Mass European immigration in the late nineteenth and early twentieth centuries.
- Asian and Latin American immigration in the late twentieth and early twenty-first centuries.

U.S. Immigration at Independence

Immigration to the American colonies and the newly independent United States came from two principal places: Europe and sub-Saharan Africa.

- **Europe.** According to the U.S. Census of 1790, 62 percent of immigrants came from Europe, of which around half came from the lands comprising the modern-day United Kingdom and Republic of Ireland. Colonies were established by British immigrants along the Atlantic coast, beginning with Jamestown, Virginia, in 1607 and Plymouth, Massachusetts, in 1620. Most Europeans were voluntary migrants, although harsh economic conditions and religious persecution in Europe blurred the distinction between forced and voluntary migration for many Europeans.
- **Sub-Saharan Africa.** The other 38 percent of U.S. immigrants at the time of independence were Africans who had been captured and forced to migrate to the Western Hemisphere, where they were sold to be enslaved (see Chapter 7). The importation of Africans to be enslaved was made illegal in 1808, though another 250,000 Africans were brought to the United States during the next half-century.

Nineteenth-Century U.S. Immigration

Between 1820 and 1920, approximately 33 million people immigrated to the United States. Nearly 90 percent emigrated from Europe. For European migrants, the United States offered a great opportunity for economic success. Early migrants extolled the virtues of the country to friends and relatives back in Europe, which encouraged still others to come.

Migration from Europe to the United States peaked at several points during the nineteenth and early twentieth centuries:

- **1840s & 1850s: Ireland & Germany.** Annual immigration to the United States jumped from 30,000 to more than 200,000 in the mid-1800s. Three-fourths of all U.S. immigrants during those two decades came from Ireland and Germany. Desperate economic factors compelled the Irish and Germans to cross the Atlantic. Germans also emigrated to escape political unrest.
- **1870s: Ireland & Germany.** Emigration from Ireland and Germany resumed following a temporary decline during the U.S. Civil War (1861–1865).
- **1880s: Scandinavia.** Immigration to the United States increased to 500,000 per year in the late 1800s. Increasing numbers of Scandinavians, especially Swedes and Norwegians, joined Germans and Irish in migrating to the United States. Stage 2 of the demographic transition – characterized by a rapid decline in the death rate – had diffused to Scandinavia, triggering a rapid population increase.
- **1905–1914: Southern & Eastern Europe.** Annual migration to the United States reached 1 million in the early 1900s (Figure 3-11). Two-thirds of all immigrants to the United States during this period came from Southern and Eastern Europe, especially Italy, Russia, and Austria-Hungary. The shift in the primary source of U.S. immigrants coincided with the diffusion of the stage 2 of the demographic transition to Southern and Eastern Europe, along with rapid population growth. Between 1880 and 1920, more than 2 million Jews immigrated to the United States from Eastern Europe to escape religious persecution.

FIGURE 3-11 IMMIGRANTS FROM ITALY ARRIVE IN THE UNITED STATES AT ELLIS ISLAND, 1911

Recent U.S. Immigration

Immigration to the United States dropped sharply in the 1930s and 1940s during the Great Depression and World War II. The number of immigrants to the United States steadily increased beginning in the 1950s and then surged to historically high levels during the early twenty-first century (Figure 3-12). More than three-fourths of the recent U.S. immigrants have emigrated from two regions: Latin America and Asia (Figure 3-13).

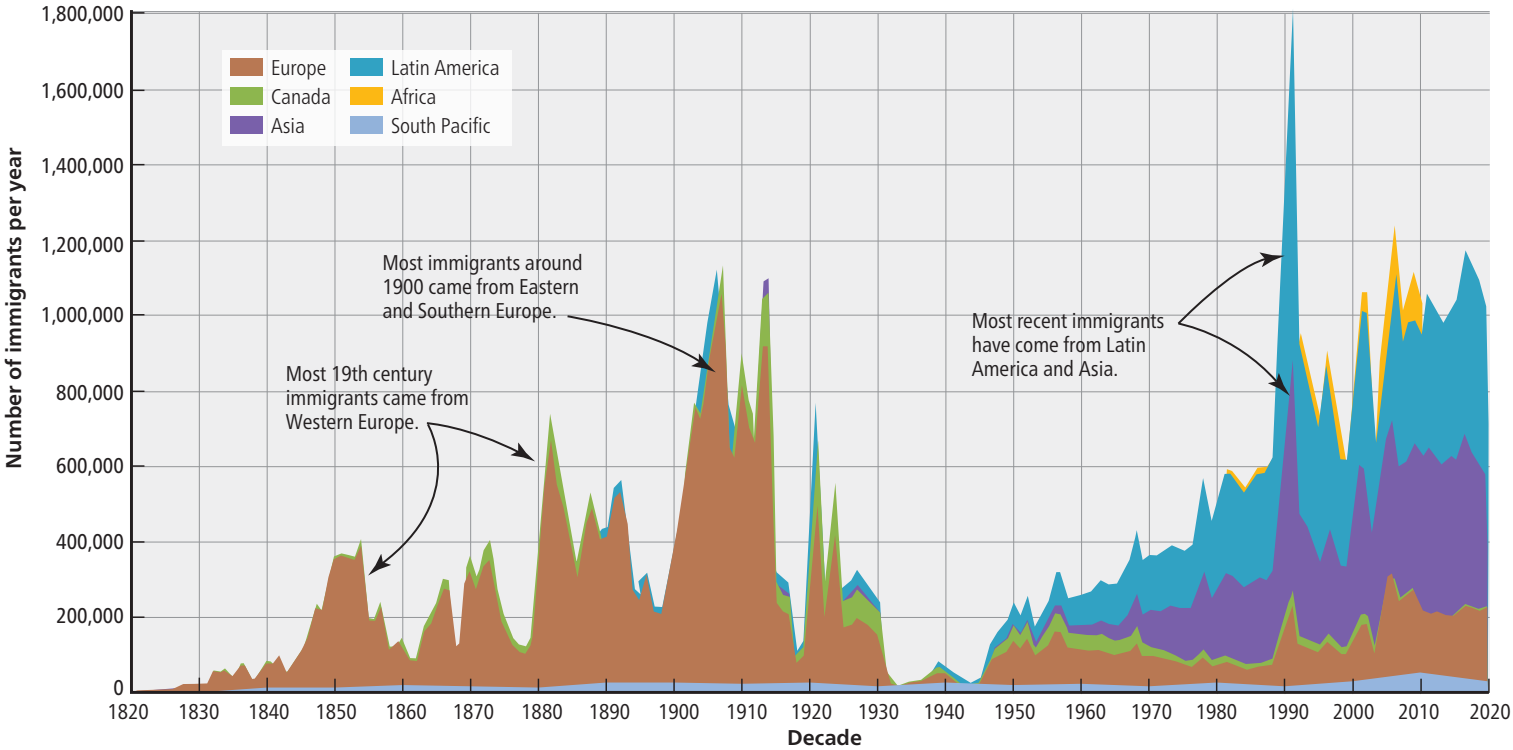
- **Latin America.** Around 19 million Latin Americans have migrated to the United States in the past 60 years, compared to only 2 million in the two preceding centuries. Officially, nearly one-half million people emigrate from Latin America to the United States annually, more than twice as many as during the entire nineteenth century. In the early 1990s, an especially large number of immigrants to the United States came from Mexico and other Latin American countries as a result of the 1986 Immigration Reform and Control Act, which issued visas to several hundred thousand people who had entered the United States in previous years without legal documents.
- **Asia.** Around 15 million Asians have migrated to the United States in the past 60 years, compared to only 1 million in the two preceding centuries. The leading sources of U.S. immigrants from Asia are China (including Hong Kong), the Philippines, India, and Vietnam.

Although the pattern of immigration to the United States has changed from predominantly European to Asian and Latin American, the reason for immigration remains the same. Rapid population growth limited prospects for economic advancement at home. Europeans left when their countries entered stage 2 of the demographic transition in the nineteenth century, and Latin Americans and Asians began to leave in large numbers in recent years after their countries entered stage 2. With unfavorable prospects at home, immigrants were lured by economic opportunity and social advancement in the United States.

The motives for immigrating to the country may be similar, but the United States has changed over time. The United States is no longer a sparsely settled, economically booming country with a large supply of unclaimed land. In 1912, New Mexico and Arizona were admitted as the forty-seventh and forty-eighth states. Thus, for the first time in its history, all the contiguous territory of the country was a "united" state (other than the District of Columbia). This symbolic closing of the American frontier coincided with the end of the peak period of emigration from Europe to the United States.

▲ **FIGURE 3-12 INTERNATIONAL IMMIGRANTS DAY, NEW YORK**

Pause & Reflect 3.1.3 In which stage of the demographic transition were most countries when they sent the most immigrants to the United States? Why was this the case?



▲ **FIGURE 3-13 TWO CENTURIES OF U.S. IMMIGRATION**

Source: U.S. Department of Homeland Security

Government Immigration Policies

Learning Outcome 3.1.4 Explain the ways that governments manage immigration, and explain how geographers study migration patterns.

Most countries, including the United States, have adopted legal restrictions and selective immigration policies that admit some groups of immigrants but not others. Policies toward immigrants and refugees are influenced by a number of factors: public opinion (for or against admitting migrants), economic (positive and negative impacts of newcomers on the local economy), resources (ability of the country to accommodate newcomers), and international relations (perception of humanitarian responsibility among the family of nations). The weight given to each of these factors can determine how countries address immigration.

The U.N. classifies countries according to four types of immigration policies: (1) maintain the current level of immigration, (2) increase the level, (3) reduce the level, (4) no policy. Similarly, emigration policies are identified by the same four classes. According to the U.N., 24 countries seek more immigrants (Figure 3-14), 25 want fewer immigrants, 120 wish to maintain the current level, and 27 do not have a policy. Fourteen of the 24 countries with policies to encourage more immigration are in Europe, including most of the former communist countries of Central and Eastern Europe. The 25 countries with policies to reduce immigration include 11 in Asia and 7 in Africa (Figure 3-15).

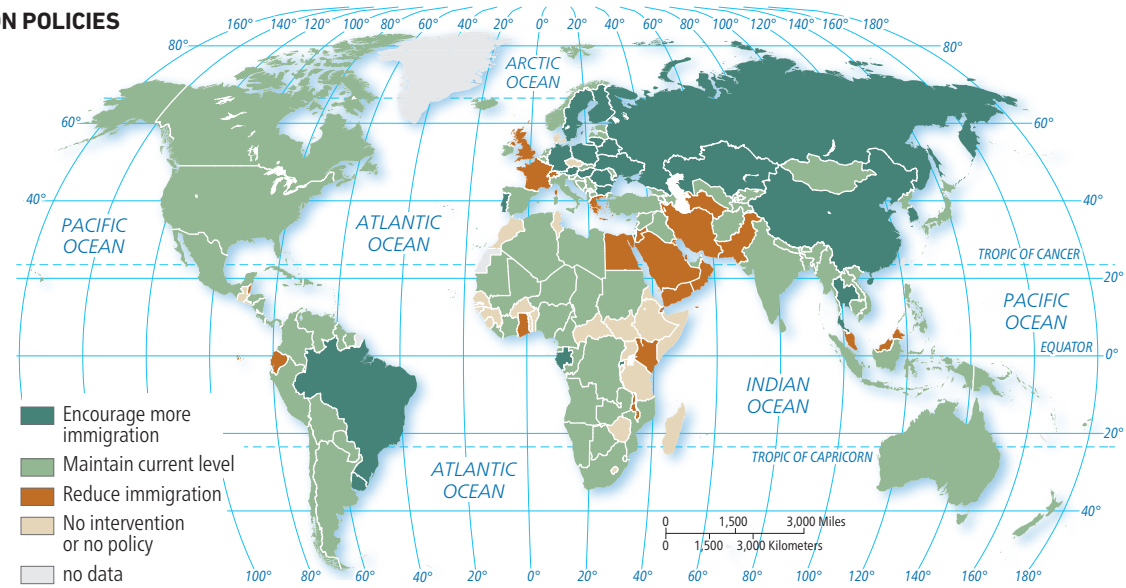
The distribution of emigration policies is different. The U.N. found policies to increase emigration in 18 countries, to decrease emigration in 46 countries, and to maintain the current level in 43 countries and 88 with no policy. The 18 countries wishing to increase emigration include 5 each in South Asia, Southeast Asia, and the South Pacific. Sub-Saharan Africa had the most countries seeking to lower emigration.

Pause & Reflect 3.1.4

Summarize the factors that influence whether a country opts to encourage, maintain, or reduce its level of immigration.

FIGURE 3-14 IMMIGRATION POLICY: SINGAPORE Immigration control, Changi Airport, Singapore. Singapore has encouraged immigration.

FIGURE 3-15 IMMIGRATION POLICIES
Source: United Nations



Migration Principles

Geography has no comprehensive theory of migration, although an outline of migration principles written by nineteenth-century geographer E. G. Ravenstein is the basis for contemporary geographic migration studies. To understand where and why migration occurs, Ravenstein's principles can be organized into three groups:

- The characteristics of migrants (discussed later in Key Issue 1).
- The distance that migrants typically move (discussed in Key Issue 2).
- The reasons why migrants move (discussed in Key Issue 3).

Migration Transition

Geographer Wilbur Zelinsky identified a migration transition, which consists of changes in a society comparable to those in the demographic transition (Table 3-1). The **migration transition** is a change in the migration pattern in a society that results from the social and economic changes that also produce the demographic transition. According to the migration transition, emigration to other countries is primarily a phenomenon of countries in stage 2 of the demographic transition (Figure 3-16), whereas internal migration, as well as immigration from other countries, is more important in stages 3 and 4 (Figures 3-17 and 3-18).

Pause & Reflect 3.1.4 What might the migration transition look like in a possible stage 5 of the demographic transition?

TABLE 3-1 | Comparing the Demographic Transition & the Migration Transition

Stage	Demographic Transition	Migration Transition
1	Low NIR, high CBR, high CDR	High daily or seasonal mobility in search of food
2	High NIR, high CBR, rapidly falling CDR	High international emigration and interregional migration from rural to urban areas
3	Declining NIR, rapidly declining CBR, declining CDR	High international immigration and intraregional migration from cities to suburbs
4	Low NIR, low CBR, low CDR	Same as stage 3

▲ **FIGURE 3-16 EMIGRATION FROM A STAGE 2 COUNTRY, BENIN** Gregoire Eulouge, who emigrated from Benin to Germany, talks with government officials about a workshop he runs to train auto mechanics.

▲ **FIGURE 3-17 IMMIGRATION FROM CENTRAL AMERICA INTO A STAGE 3 COUNTRY, MEXICO**

▲ **FIGURE 3-18 INTRAREGIONAL MIGRATION WITHIN A STAGE 4 COUNTRY, THE UNITED KINGDOM** From the city of Leeds to the suburb of Middleton.

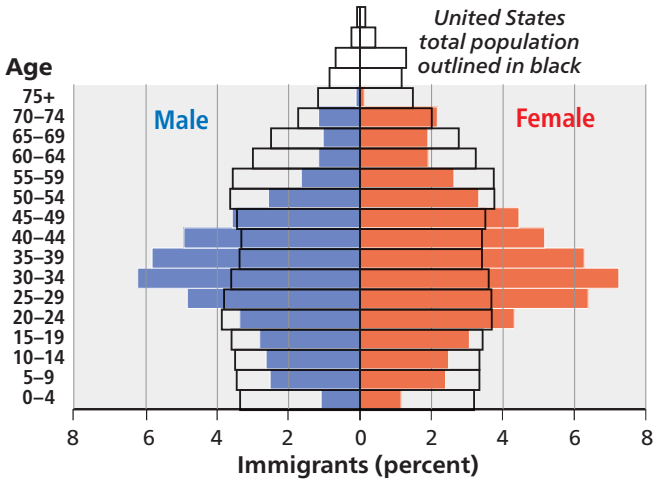
Gender & Age of Migrants

Learning Outcome 3.1.5 Describe the demographic characteristics of immigrants to the United States.

When forming his theory in the nineteenth century, Ravenstein noted distinctive gender and family-status patterns in his migration theories:

- Most long-distance migrants were male.
- Most long-distance migrants were adult individuals rather than families with children.

Adult males may have constituted the majority of migrants in the past, but that pattern has changed. In reality, women and children have constituted a high percentage of migrants for a long time.



▲ **FIGURE 3-19 AGE AND SEX OF IMMIGRANTS IN THE UNITED STATES COMPARED WITH THE OVERALL U.S. POPULATION**

Age of Migrants

Ravenstein theorized that most long-distance migrants were young adults seeking work rather than children or elderly people. Recent migration patterns in the United States match the theory in some respects but not in others (Figure 3-19).

A relatively high share of U.S. immigrants are young adults, as Ravenstein expected. People between the ages of 20 and 39 comprise only 27 percent of the entire U.S. population, compared with 45 percent of recent immigrants. Immigrants are, as expected, less likely to be elderly people. People age 65 and above comprise 17 percent of the entire U.S. population but only 6 percent of recent immigrants to the United States.

People under age 20 comprise 19 percent of immigrants to the United States, lower than the 25 percent share in the total U.S. population. However, the number of unaccompanied minors trying to cross into the United States without proper documentation has increased sharply in recent years. Nearly 90 percent of unaccompanied minors trying to reach the United States without proper documentation have been males between 12 and 17. As with other migration flows, the large increase in teenage boys attempting to immigrate into the United States stems from a mix of push and pull factors. Many are pushed out of Honduras and El Salvador because of increased gang violence in those countries and are pulled to the United States because of rumors that they won't be deported if caught (Figure 3-20).

Pause & Reflect 3.1.5 Why might elderly people be less likely than younger people to migrate internationally?

▼ **FIGURE 3-20 YOUNG MEN FROM HONDURAS AND GUATEMALA CROSS THROUGH MEXICO IN HOPES OF ULTIMATELY REACHING THE UNITED STATES**

Gender of Migrants

Ravenstein theorized that males were more likely than females to migrate long distances to other countries because searching for work was the main reason for international migration and males were much more likely than females to be employed. This held true for U.S. immigrants during the nineteenth and much of the twentieth centuries, when about 55 percent were male. But female immigrants to the United States began to outnumber male immigrants during the late twentieth century, and now female immigrants comprise 54 percent of the total entering the country (Figure 3-21). Female immigrants also outnumber male immigrants in other developed countries.

Two factors contribute to the larger share of females migrating to developed countries than theorized by Ravenstein:

- Because most people migrate to developed countries for job opportunities, the high percentage of women in the labor force in these countries logically attracts a high percentage of female immigrants.
- Some developed countries have made it possible for wives to join husbands who have already immigrated.

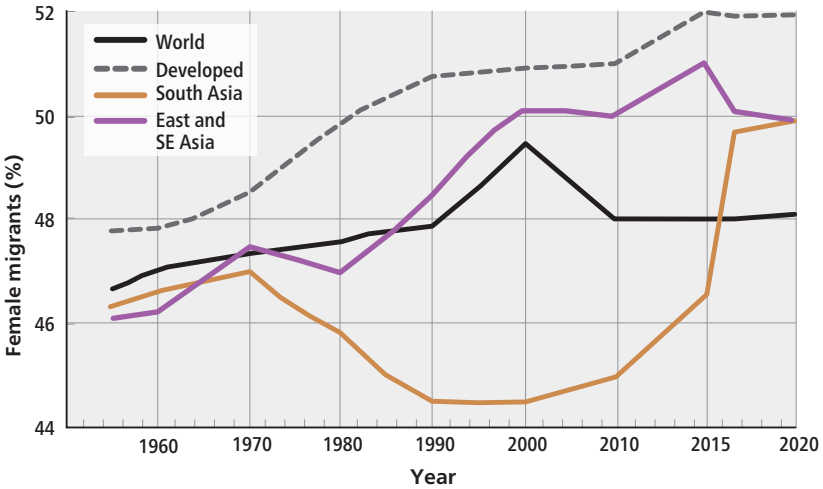
From developing countries, the percentage of female migrants has risen sharply since the late twentieth century. Approximately one-half of migrants in Asia are women (Figure 3-22).

The increased female migration from Mexico to the United States partly reflects the changing role of women in Mexican society. In the past, rural Mexican women were obliged to marry at a young age and to remain in the village to care for children. Now some Mexican women are migrating to the United States to join husbands or brothers already in the United States, but most of those migrating women are seeking jobs. At the same time, women feel increased pressure to get jobs in the United States because of less favorable economic conditions in Mexico.

(a)

(b)

▲ **FIGURE 3-21 MOSTLY FEMALE IMMIGRANTS IN DEVELOPED COUNTRIES** (a) Naturalization ceremony for immigrants to the United States to become citizens. (b) Immigrants from Eritrea arrive in Europe, changing trains in Italy en route to Germany.



◀ **FIGURE 3-22 FEMALE MIGRANTS AS A PERCENTAGE OF ALL MIGRANTS** Female migrants outnumber males in developed countries.

Source: United Nations

KEY ISSUE

3.2 | Where Do People Migrate Within Countries?

Internal migration for most people is less disruptive than international migration. As noted earlier in the chapter, the two main types of internal migration are interregional (between regions of a country) and intraregional (within a region).

In the past, people migrated from one region of a country to another in search of better farmland. Lack of farmland pushed many people from the more densely settled regions of the country and lured them to the frontier, where land was abundant. Today, the principal type of interregional migration is from rural areas to urban areas. Most jobs, especially in services, are clustered in urban areas (see Chapter 12).

Interregional Migration: United States

Learning Outcome 3.2.1 Describe migration patterns among U.S. regions.

An especially prominent example of large-scale internal migration is the opening of the American West. At the time of independence, the United States consisted of long-established settlements concentrated on the Atlantic Coast and a scattering of newer settlements in the territories west of the Appalachian Mountains. Through mass interregional migration, the interior of the continent was settled and developed.

The U.S. Census Bureau computes the country's population center at the time of each census. The population center is the average location of everyone in the country, the "center of population gravity." If the United States were a flat plane placed on the head of a pin and each individual person in the country were given the same weight, the population center would be the point where the population distribution causes the flat plane to balance on the head of a pin.

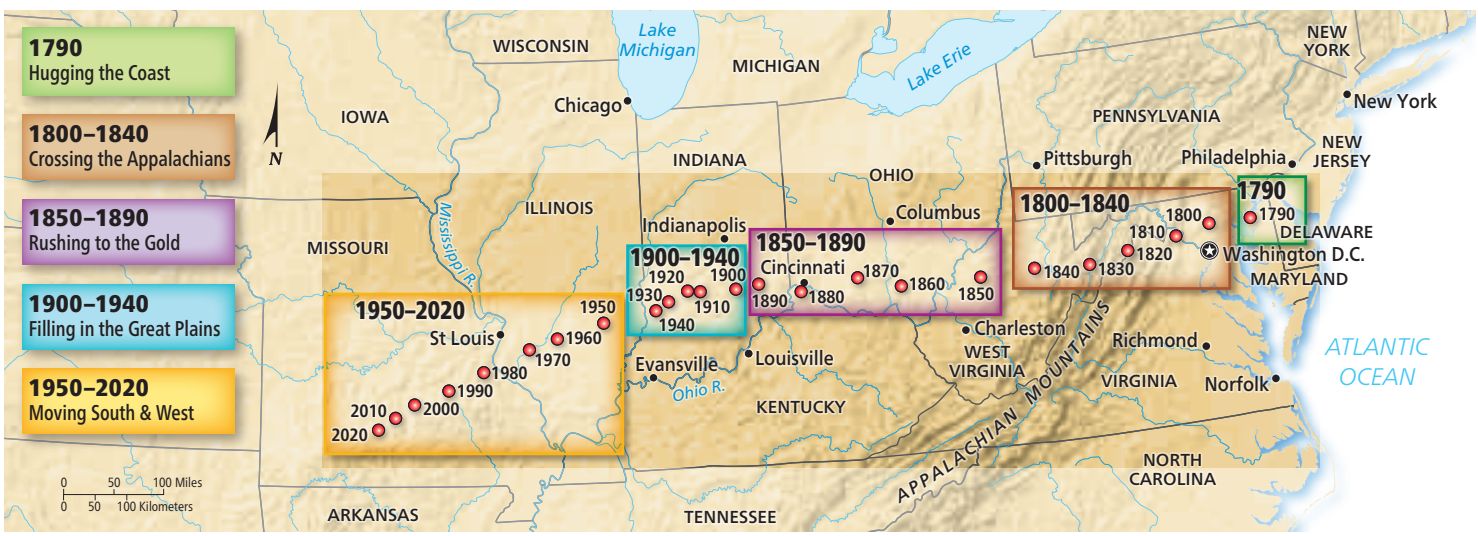
The changing location of the population center graphically demonstrates the march of the American people across the North American continent over the past 200 years (Figure 3-23). The center has consistently shifted westward, although the rate of movement has varied in different eras.

1790: Hugging the Coast

Virtually all colonial-era settlements were near the Atlantic Coast by the end of the 1700s. Few colonists ventured far from coastal locations because they depended on shipping links with Europe to import products and to export raw materials. The Appalachian Mountains also initially hindered western development because of their steep slopes, thick forests, and few gaps that allowed easy passage. West of the Appalachians, Native Americans still occupied large areas and sometimes resisted the expansion of colonial settlement.

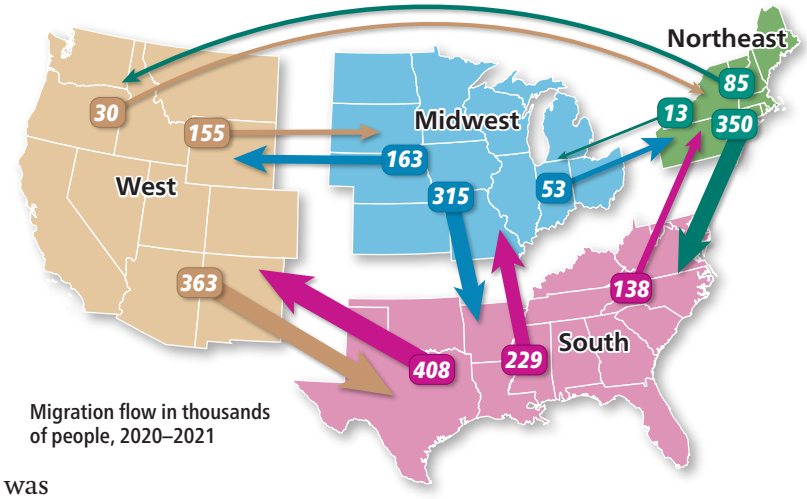
1800–1840: Crossing the Appalachians

Transportation improvements, especially the building of canals in the northeast, helped open the interior of the United States. Most important was the construction of the Erie Canal, which enabled people to travel inexpensively by boat between New York City and the Great Lakes. In 1840, the United States had 5,353 kilometers (3,326 miles) of canals. Encouraged by the opportunity to obtain a large amount of land at a low price, people moved into forested river valleys between the Appalachians and the Mississippi River. They cut down the trees and used the wood to build homes, barns, and fences.



▲ **FIGURE 3-23 CHANGING CENTER OF U.S. POPULATION** In the late 1700s, the population center of the United States was on the East Coast, but soon thereafter it shifted west. In 2020, the population center of the country was near Hartville, Missouri.

▲ **FIGURE 3-24 MIGRATING ACROSS THE GREAT PLAINS, APPROXIMATELY 1890**



▲ **FIGURE 3-25 INTERREGIONAL MIGRATION WITHIN THE UNITED STATES, 2020–2021**

Source: U.S. Census.

1850–1890: Rushing to the Gold

The U.S. population center shifted westward more rapidly during the second half of the nineteenth century. Rather than continuing to expand agriculture into the next available westward land, mid-nineteenth-century pioneers kept going all the way to California. The principal pull to California was the Gold Rush, beginning in the late 1840s. Pioneers during this period also passed over the Great Plains because of the physical environment. The region's dry climate, lack of trees, and tough grassland sod convinced leaders such as Thomas Jefferson and explorers such as Zebulon Pike that the region was a desert unfit for farming. Government maps at the time labeled the Great Plains as the Great American Desert.

1900–1940: Filling in the Great Plains

The westward movement of the U.S. population center slowed during the first half of the twentieth century because emigration from Europe to the East Coast offset most of the emigration from the East Coast to the U.S. West. Also, immigrants began to fill in the Great Plains that earlier generations had bypassed (Figure 3-24). Advances in agricultural technology enabled people to cultivate the region's land. Farmers used barbed wire to reduce dependence on wood fencing, the steel plow to cut the thick sod, and windmills and well-drilling equipment to pump more water from the ground. The expansion of the railroads encouraged settlement of the Great Plains. The federal government gave large land grants to the railroad companies, which financed construction of their lines by selling portions to farmers. The extensive rail network then permitted settlers to transport their products to the large concentrations of customers in East Coast cities.

1950–2010: Moving South

The U.S. population center resumed a more vigorous westward migration beginning in the 1950s. The population center also moved southward then, as Americans migrated to the South for job opportunities and a warmer climate. The rapid growth of population and employment in the South has aggravated interregional antagonism because a number of companies closed their operations in the Northeast and Midwest and relocated to the South. However, much of the South's industrial growth comes from newly established companies.

Interregional migration has slowed considerably in the United States into the twenty-first century. Regional differences in employment prospects have become less dramatic. The severe recession of 2008–2009 discouraged people from migrating because of limited job prospects in all regions of the United States, and fewer Americans migrated during the height of the COVID-19 pandemic in 2020. Still, the largest interregional net migration flow remains from the Northeast to the South (Figure 3-25).

Pause & Reflect 3.2.1 How might climate change affect patterns of interregional migration in the United States?

Interregional Migration in Selective Countries

Learning Outcome 3.2.2 Compare interregional migration in several large countries.

As in the United States, interregional migration has been important in relatively large countries both developing and developed. However, reasons for interregional migration vary among countries.

Interregional Migration: Brazil

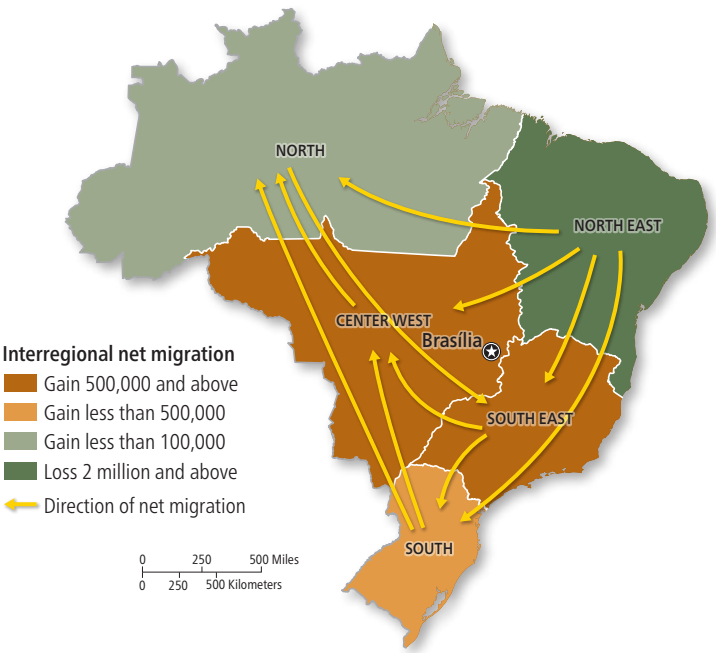
Most Brazilians live in a string of large cities near the East Coast of Brazil. The country's tropical interior is sparsely inhabited. To increase the attractiveness of the interior, the government moved its capital in 1960 from Rio de Janeiro to a newly built city called Brasília, situated 900 kilometers (600 miles) from the Atlantic Coast (Figure 3-26). Development of Brazil's interior has altered historic migration patterns into the large urban areas along the coast. The coastal areas now have net out-migration, whereas the interior areas have net in-migration (Figure 3-27).

Interregional Migration: Nigeria

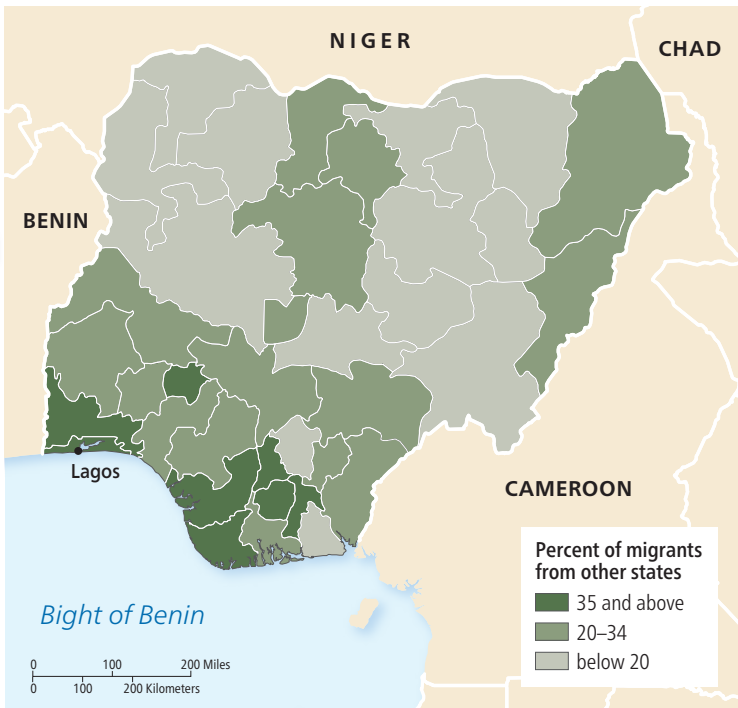
Many Nigerians – like Brazilians – are migrating to cities in search of jobs, such as in the construction industry (Figure 3-28). The largest flow of migrants is from the north to the southwest, the location of Lagos, one of the world's largest and fastest-growing cities, with more than 16 million inhabitants (Figure 3-29). Nigerians are also moving out of northern areas because of fewer job prospects and because of a continuing terrorism threat there. Some of the interregional migration is leaving rural land that is becoming less productive as well as coastal areas that are subject to flooding. One-half of internal migrants are between the ages of 20 and 34. Half are male, and half are female.

▲ **FIGURE 3-26 BRASÍLIA: A CITY OF IMMIGRANTS** Brasília has around 4.8 million inhabitants, nearly all of whom are immigrants.

▲ **FIGURE 3-28 CONSTRUCTION WORKER IN LAGOS, NIGERIA**



▲ **FIGURE 3-27 INTERREGIONAL MIGRATION: BRAZIL** Net migration in Brazil is from coastal regions to interior ones.



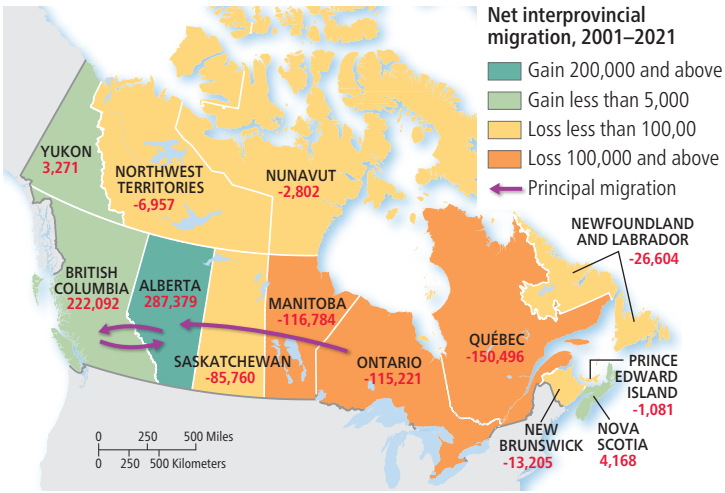
▲ **FIGURE 3-29 INTERREGIONAL MIGRATION: NIGERIA**

Interregional Migration: Canada

Canada, like the United States, has had interregional migration primarily from east to west for more than a century. Between 2001 and 2021, Alberta had the largest net in-migration and Québec the largest net out-migration (Figure 3-30). The three largest interprovincial flows in Canada are from Ontario to Alberta, from British Columbia to Alberta, and from Alberta to British Columbia.

The principal lure of Alberta has been jobs in the oil industry (Figure 3-31). Many Canadians move to Alberta to work in the oilfields. The rate of interprovincial migration into Alberta increases during periods of high oil prices.

Québec has experienced relatively high net out-migration in part because of the province's restrictions on the use of languages other than French (see Chapter 5). People using a language other than French (either English or another language) have had especially high rates of out-migration from Québec.



▲ **FIGURE 3-30 INTERREGIONAL MIGRATION: CANADA**

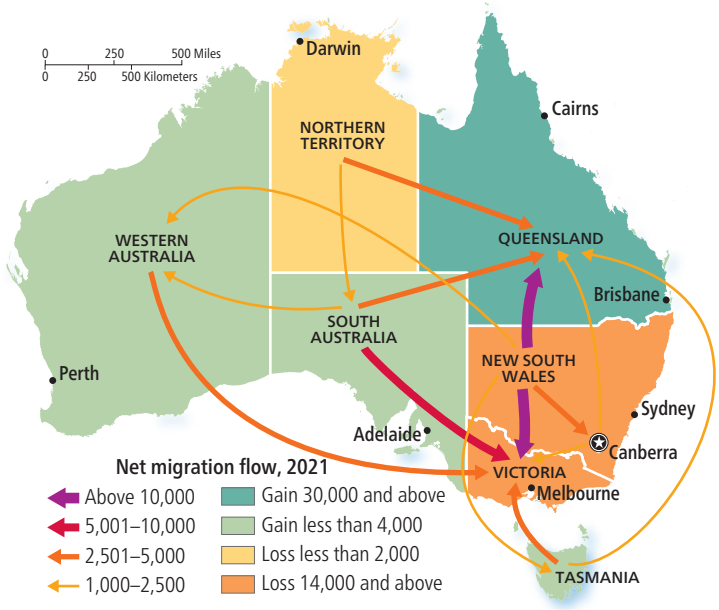
Interregional Migration: Australia

Australia has one of the world's highest rates of internal migration, around 15 percent per year, compared with a world average of 8 percent per year. The most popular destination for Australia's interregional migrants by a wide margin is the state of Queensland (Figure 3-32).

In the past, Queensland attracted interregional migrants seeking jobs in the mining industry located in the interior of the state. Most migrants now head for the state's coastal communities. Retired people are attracted by ideal weather and oceanfront leisure activities (Figure 3-33). Many younger interregional migrants were escaping crowded cities to the south, especially after the need for social distancing with the onset of the COVID-19 pandemic.

Others are moving to Queensland for employment in services, which are expanding to meet the needs of the increased population. Health care is the state's leading employer. Still others migrate to Queensland to construct the large numbers of new houses and commercial buildings.

▲ **FIGURE 3-31 NET IN-MIGRATION: ALBERTA** Production site and facilities in Athabasca Tar Sands, Alberta.



▲ **FIGURE 3-32 INTERREGIONAL MIGRATION: AUSTRALIA**

▲ **FIGURE 3-33 NET INMIGRATION: QUEENSLAND** Surfers Paradise attracts immigrants from elsewhere in Australia.

Pause & Reflect 3.2.2 Does Australia's interregional migration pattern more closely resemble that of the United States and Canada or that of Brazil and Nigeria?

Intraregional Migration

Learning Outcome 3.2.3 Describe three types of intraregional migration.

Intraregional migration, the migration of people within a region, is much more common than interregional or international migration. Most intraregional migration is from rural to urban areas in developing countries and from cities to suburbs in developed countries.

From Rural to Urban Areas

Migration from rural (or nonmetropolitan) areas to urban (or metropolitan) areas began in the 1800s in Europe and North America as part of the Industrial Revolution (see Chapter 11). The percentage of people living in urban areas in the United States, for example, increased from 5 percent in 1800 to 50 percent in 1920 and 83 percent in 2022.

In recent years, urbanization has diffused to developing countries in Asia, Latin America, and Africa (see Chapter 12). Between 1950 and 2022, the percentage living in urban areas increased from 40 percent to 81 percent in Latin America, 10 percent to 42 percent in sub-Saharan Africa, and from 15 percent to 52 percent in Asia (Figure 3-34). As with interregional migrants, most intraregional migrants who move from rural to urban areas seek economic advancement. They are pushed from rural areas by declining opportunities and financial hardships in agricultural areas, such as the high cost of renting farmland, and are pulled to the cities by the prospect of work in factories or in service industries (Figure 3-35).

From Urban to Suburban Areas

Most intraregional migration in developed countries is from cities to surrounding suburbs. The population of most cities in developed countries has declined since the mid-twentieth century while suburbs have grown rapidly. Nearly twice as many Americans migrate from cities to suburbs each year as migrate from suburbs to cities (Figure 3-36). Comparable patterns are found in Canada and Europe.

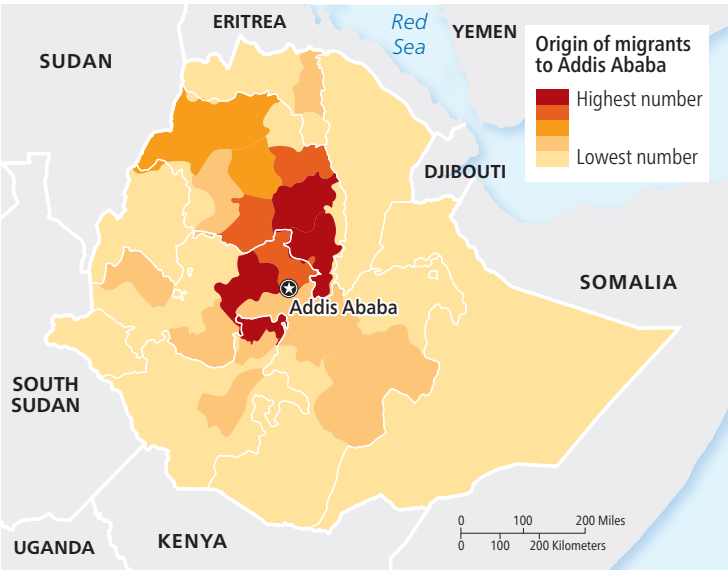
The major reason for the large-scale migration to the suburbs is not related to employment, as is the case with other forms of migration. For most people, migration to suburbs does not coincide with changing jobs. Instead, people are attracted by a suburban lifestyle.

Suburbs offer the opportunity to live in a detached house rather than an apartment, surrounded by a private yard where children can play safely. A garage or driveway on the property guarantees space to park cars at no extra charge. In the United States, suburban schools tend to be more modern, better equipped, and less crowded than those in cities. Cars and trains enable people to live in suburbs yet have access to jobs, shops, and recreational facilities throughout the urban area (see Chapter 13).

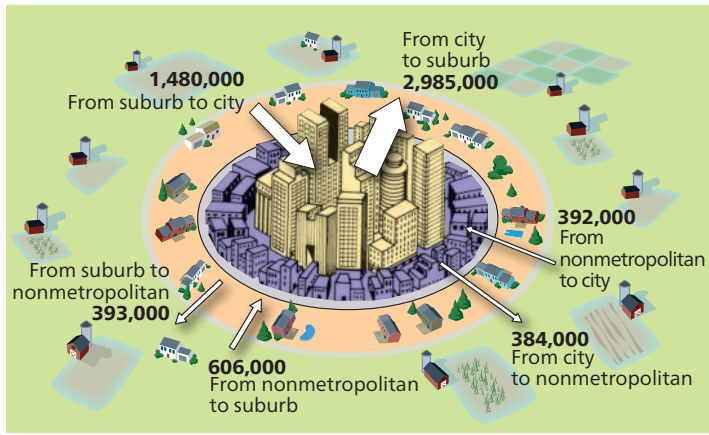
As a result of suburbanization, the territory occupied by urban areas has rapidly expanded. To accommodate suburban growth, farms on the periphery of urban areas are converted to housing and commercial developments, where new roads, sewers, and other services must be built.

▲ **FIGURE 3-35 RURAL TO URBAN MIGRATION: ETHIOPIANS WHO RECENTLY ARRIVED IN ADDIS ABABA**

▼ **FIGURE 3-34 RURAL TO URBAN MIGRATION: ETHIOPIA** Intraregional migration has been into Addis Ababa, the capital and largest city, especially from rural areas to the north.



▼ **FIGURE 3-36 URBAN TO SUBURBAN MIGRATION: UNITED STATES** Intraregional migration is primarily from cities to suburbs. Figures are total U.S. intraregional migrants between 2020 and 2021.
Source: U.S. Census



From Urban to Rural Areas

Developed countries witnessed a new migration trend beginning in the late twentieth century. For the first time, more people immigrated into rural areas than emigrated out of them in some years. Net migration from urban to rural areas is called **counterurbanization**.

The boundary where suburbs end and the countryside begins cannot be precisely defined. Counterurbanization results in part from very rapid expansion of suburbs. But some counterurbanization represents genuine migration from cities and suburbs to small towns and rural communities (Figure 3-37).

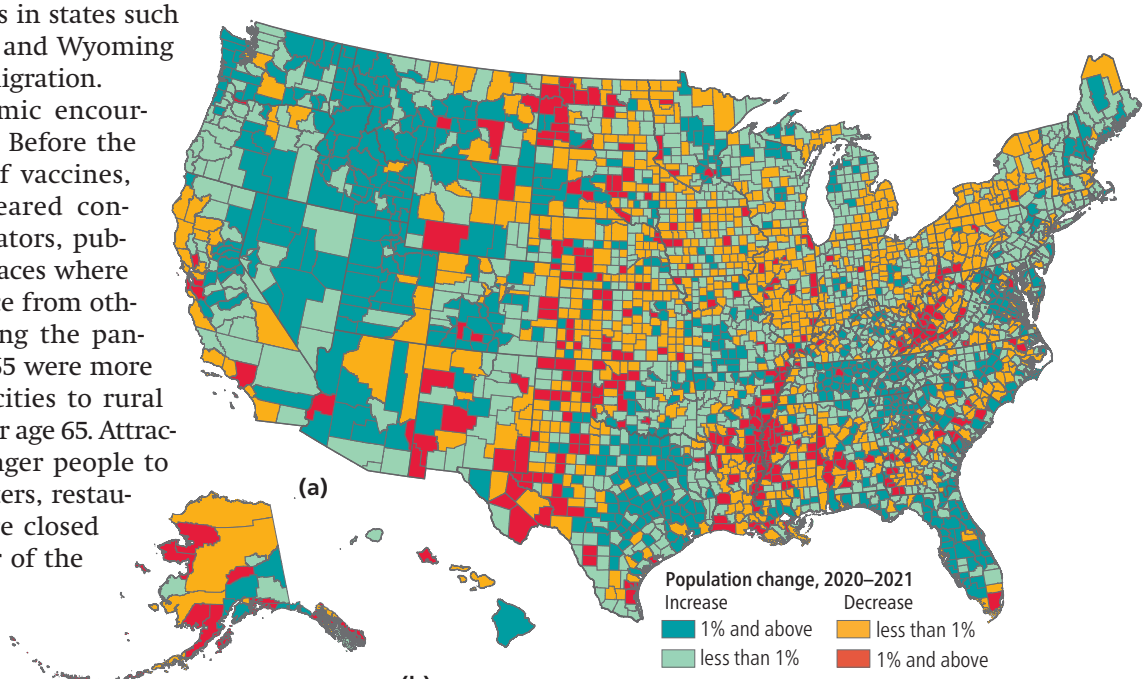
As with suburbanization, people move from urban to rural areas for lifestyle reasons. Some are lured to rural areas by the prospect of swapping the frantic pace of urban life for the opportunity to live on a farm, where they can own horses or grow vegetables. Others move to farms but do not earn their living from agriculture; instead, they work in nearby offices, small town shops, or other services. In the United States, evidence of counterurbanization can be seen primarily in the Rocky Mountain states. Some rural counties in states such as Colorado, Idaho, Utah, and Wyoming have experienced net in-migration.

The COVID-19 pandemic encouraged counterubanization. Before the widespread availability of vaccines, many urban residents feared contracting COVID-19 in elevators, public transport, and other places where maintaining a safe distance from others was impossible. During the pandemic, people under age 65 were more likely to emigrate from cities to rural areas than were people over age 65. Attractions that had lured younger people to urban areas, such as theaters, restaurants, and museums, were closed for much of the first year of the pandemic, and with their offices closed, young people could work from any home regardless of its location. The Federal Reserve Bank of Cleveland calculated that net migration from urban to rural areas in the United States increased from around 250,000 per year prior to COVID-19 to nearly 1 million in 2021, the first full year of the pandemic.

With modern communications and transportation systems, no location in a developed country is truly isolated, either economically or socially. Computers, tablets, and smartphones enable us to work anywhere and still have access to an international network. We can buy most products online and have them delivered within a few days. We can follow the fortunes of our favorite teams anywhere in the country, thanks to cable, satellite dishes, and webcasts.

Intraregional migration in the United States has slowed considerably since the 1980s. Most intraregional migration in the United States continues to be between cities and suburbs. Since 2010, the number of Americans moving from cities to suburbs has decreased, whereas the number moving from suburbs to cities has increased. Counterurbanization is not a phenomenon every year. Cities have become more attractive, especially to younger people (see Chapter 13).

Pause & Reflect 3.2.3 Why might rural to urban migration be most intense in countries in stage 2 of the demographic transition?



(b)

FIGURE 3-37 COUNTERURBANIZATION (a) Population change by county, 2020-2021. Most counties that had population growth between 2019 and 2020 are in the South and West, including many rural counties. (b) New home construction in Idaho, a state that has experienced net in-migration in recent years.

Source: U.S. Census

KEY ISSUE

3.3 | Why Do People Migrate?

Ravenstein's principles help geographers explain the reasons why people migrate. Most people migrate for economic reasons. Political and environmental reasons also induce migration, although not as frequently as economic reasons. One of these reasons usually emerges as most important, although elements of more than one reason may be detectable. Ranking the relative importance of the reasons may be difficult and even controversial.

Environmental Reasons for Migrating

Learning Outcome 3.3.1 Explain environmental reasons for migrating.

People migrate because of push factors and pull factors:

- A **push factor** induces people to move out of their present location.
- A **pull factor** induces people to move into a new location.

As migration for most people is a major step not taken lightly, both push and pull factors typically play a role. To migrate, people view their current place of residence so negatively that they feel pushed away, and they view another place so positively that they feel pulled toward it.

An environmental or political feature that hinders migration is an **intervening obstacle**. The principal obstacle traditionally faced by most migrants to other countries was environmental: the long, arduous, and expensive passage over land or by sea. Transportation improvements have diminished environmental obstacles. Today, the major obstacles faced by most migrants are political. Legally, a migrant typically needs a passport to emigrate from a country and a visa to immigrate to a new country. Intervening obstacles often cause people to engage in **step migration**, which is migration that follows a path of a series of stages or steps toward a final destination.

People are pulled toward physically attractive regions and pushed from hazardous ones. In this age of improved communications and transportation systems, people can live in environmentally attractive areas that are relatively remote and still not feel too isolated from employment, shopping, and entertainment opportunities. At the same time, environmental factors result in the forced migration of some people, especially those who are socially and economically disadvantaged.

▲ **FIGURE 3-38 PULL FACTOR: ATTRACTIVE ENVIRONMENT** Antibes, France.

Pull Factor: Attractive Environments

Attractive environments for migrants include mountains, seasides, and warm climates. Proximity to the Rocky Mountains lures Americans to the state of Colorado, and the Alps pull French people to eastern France. The highlands of Scotland are attracting migrants from southern areas of the United Kingdom.

Regions with warm winters, such as southern Spain and the southwestern United States, attract migrants from harsher climates. The Atlantic and Gulf coasts of Florida, the southern coast of England, and the Mediterranean coast of France (Figure 3-38) attract migrants, especially retirees, who enjoy swimming and lying on the beach. Of all elderly people who migrate from one U.S. state to another, one third select Florida as their destination.

Push Factor: Rising Seas

Migrants are sometimes pushed from their homes by adverse physical conditions. Water – either too much or too little – poses the most common environmental threat.

Many people are forced to move by water-related disasters because they live in a vulnerable area, such as a floodplain. A **floodplain** is an area subject to flooding during a specific number of years, based on historical trends. People living in a "100-year floodplain," for example, can expect flooding on average once every century. Many people are unaware that they live in a floodplain, and even people who do know often choose to live there anyway (Figure 3-39).

Many low-lying areas are in danger because of rising ocean levels. Sea levels rose around 17 centimeters (6.7 inches) during the twentieth century. Scientists working for the United Nations forecast greater sea-level rise during the twenty-first century.

▼ **FIGURE 3-39 PUSH FACTOR: RISING SEAS** A retractable barrier system on the River Thames is designed to prevent the floodplain of most of London from being flooded by exceptionally high tides and storm surges moving up from the North Sea.

Push Factor: Rising Seas in Alaska

Rising sea levels because of climate change can force people to migrate from low-lying coastal areas. Forced migration because of rising sea levels occurs in such disparate locations as Alaska and Kiribati.

Shishmaref, Alaska, is located along the Bering Strait. The village's 576 inhabitants are mostly Iñupiaq Native Americans who rely on hunting seals and other sea mammals. The shoreline along the Bering Strait has been receding at a rate of more than 3 meters (10 feet) per year (Figure 3-40). As a result, houses along the shoreline are being destroyed (Figure 3-41).

Scientists attribute the receding shoreline in Shishmaref to rising temperatures. Sea ice is melting along the Bering Strait, as is the permafrost on which the village of Shishmaref is built.

▲ **FIGURE 3-41 RISING SEAS IN ALASKA: HOUSES DESTROYED ALONG THE SHORELINE, SHISHMAREF, ALASKA**

▲ **FIGURE 3-40 RISING SEAS IN ALASKA: ERODING SHORELINE, SHISHMAREF, ALASKA**

Push Factor: Rising Seas in Kiribati

The country of Kiribati, a collection of 33 small islands, in the Pacific Ocean, has already witnessed the disappearance of two of its islands under rising sea levels (Figure 3-42). Anticipating that the remaining islands will be submerged by 2050, Kiribati purchased 2,500 hectares (6,000 acres) of land in Fiji in 2014, as a place to relocate all the country's 124,000 inhabitants. Kiribati Former President Anote Tong called the project "migration with dignity."

President Tong's successor Taneti Maamau has not implemented the migration program. He argues that improving the standard of living can generate resources for the impoverished country to adapt to rising seas, such as by constructing strong seawalls.

Kiribati and other Pacific islands are atolls – that is, islands made of coral reefs. A coral is a small sedentary marine animal that has a skeleton made of calcium carbonate. Corals form colonies, and the skeletons build up to form coral reefs. The threat of climate change to the sustainability of coral is especially severe: Coral stays alive in only a narrow range of ocean temperatures,between 23°C and 25°C (between 73°F and 77°F), so global warming threatens the ecology of atolls even if portions of the islands remain above sea level.

Humans are attracted to coral for its beauty and the diversity of species it supports. President Maamau is hopeful that tourists can be attracted to view the country's outstanding coral. But coral is very fragile, and human-caused water pollution and physical damage – as well as warming temperatures – can kill it.

Pause & Reflect 3.3.1 How have the houses in Kiribati shown in Figure 3-42 been constructed to adapt to rising seas?

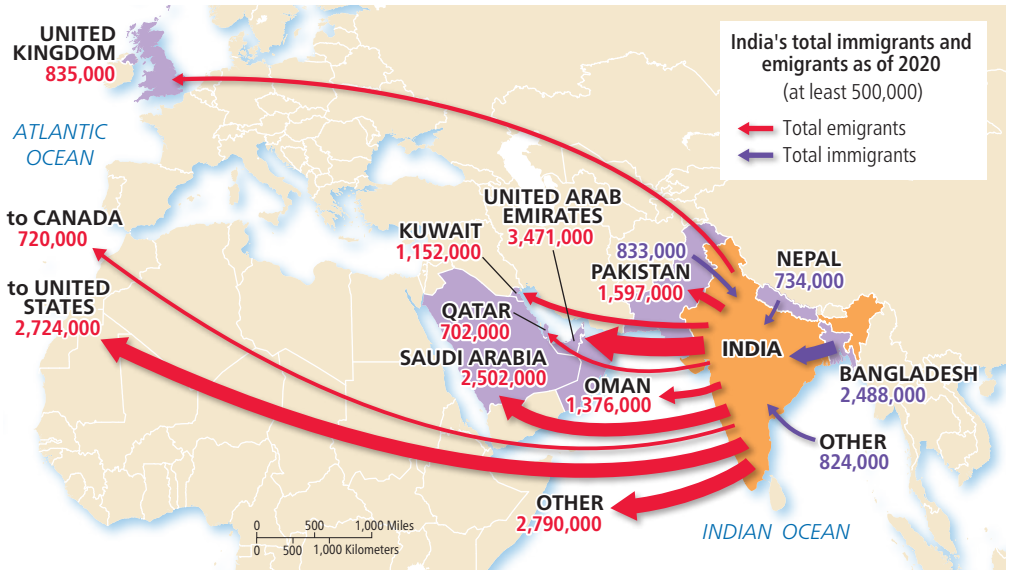
▼ **FIGURE 3-42 FLOODING IN KIRIBATI**

Economic Reasons for Migrating

Learning Outcome 3.3.2 Identify economic reasons for international migration.

Most people migrate for economic reasons. People often emigrate from places that have few job opportunities and immigrate to places where jobs seem to be available. Because of economic restructuring, job prospects often vary from one country to another and within regions of the same country.

The United States and Canada have been especially prominent destinations for economic migrants. Many European immigrants to North America in the nineteenth century truly expected to find streets paved with gold. Although not literally so gilded, the United States and Canada did offer Europeans prospects for economic advancement. This same perception of economic plenty now lures people to the United States and Canada from Latin America and Asia.



▲ **FIGURE 3-43 INDIA'S TOTAL IMMIGRANTS AND EMIGRANTS** Shown are countries with at least 500,000 emigrants from India or are countries from which at least 500,000 immigrants are living in India as of 2020.

▼ **FIGURE 3-44 EMIGRANTS FROM INDIA** Emigrants from India arrive in Israel.

Economic Migration from South Asia & East Asia

The world's largest sources of migrants in search of work emigrate from South and East Asia. More than 2 million people annually emigrate from India (Figures 3-43 and 3-44), Bangladesh, China, and Pakistan. An estimated 50 million Chinese and 32 million Indians live in other countries. The United States is a leading receiving country of immigrants, although most Asian migrants have migrated to other countries in Asia. The largest numbers of emigrants from China are in Thailand, Malaysia, the United States, Indonesia, Singapore, and Myanmar. The largest numbers of emigrants from India are in the United States, United Arab Emirates, Malaysia, Saudi Arabia, and Myanmar.

The oil-producing countries of Southwest Asia have been major destinations for people from the South Asian countries of India, Bangladesh, and Pakistan as well as the Philippines, Thailand, and other countries in Southeast Asia. In addition, citizens of countries in Southwest Asia without oil reserves have emigrated to oil-producing countries in the same region. Immigrants comprise 88 percent each of the population of the United Arab Emirates (UAE) and Qatar (Figure 3-45), 70 percent of Kuwait, and 51 percent of Bahrain. Saudi Arabia and the UAE have the largest numbers of immigrants in the region.

▼ **FIGURE 3-45 IMMIGRANTS TO QATAR** Allowed to work on building soccer stadiums for the 2022 World Cup.

Remittances

People unable to migrate permanently to a new country for employment opportunities may be allowed to migrate temporarily. Examples of temporary work are found in Asia and in Europe. Asia is both a major source and a major destination for migrants in search of work.

Migrants who find work in another country frequently send a portion of the wages they have earned to relatives back home. The transfer of money by workers to people in the country from which they emigrated is a **remittance**.

The cost of transferring money is high in many places. Banks and firms such as Western Union that specialize in money transfers charge high fees for the service (Figure 3-46). To transfer money from the United States, Western Union charges up to 6 percent (Figure 3-47). Bank fees may result in additional charges.

The total amount of remittances worldwide was $702 billion in 2020. The figure had been increasing by nearly 10 percent annually until declining during the COVID-19 pandemic, when fewer migrants were able to find work in other countries. Remittances are a significant portion of basic income for people in developing countries, especially following cutbacks in official assistance from foreign governments and international aid agencies (Figure 3-48).

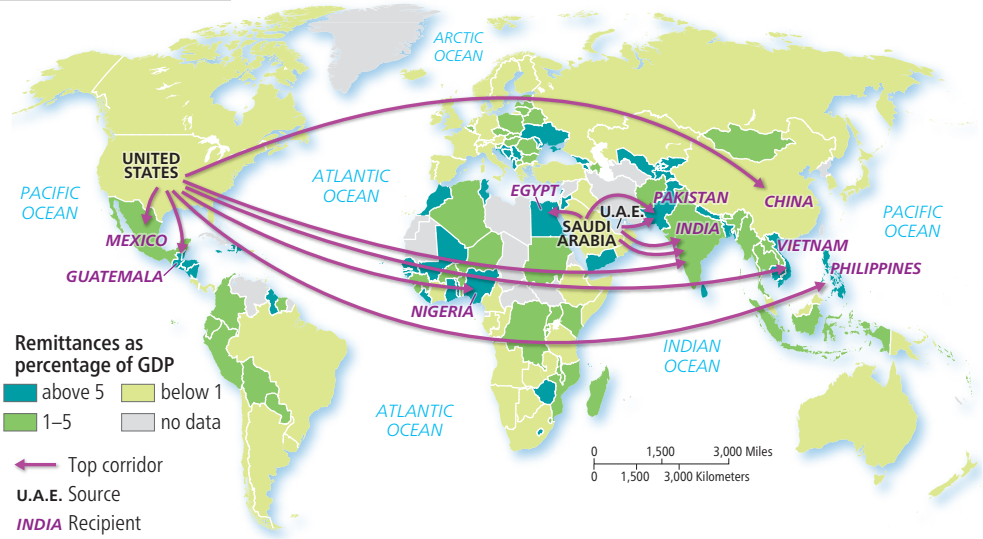
People in India received the most remittances in 2020 ($83 billion), followed by people in China ($60 billion). Nearly one-third of the GDP of Tajikistan and Kyrgyzstan comprised remittances, primarily from migrants working in Russia.

Working conditions for immigrants have been considered troubling in some of these countries. The Philippine government determined in 2011 that only two countries in Southwest Asia—Israel and Oman—were "safe" for their Filipino migrants, and the others lacked adequate protection for workers' rights. For their part, oil-producing countries such as UAE and Qatar fear that the increasing numbers of immigrants will spark political unrest and abandonment of traditional Islamic customs.

Pause & Reflect 3.3.2 How would you expect a country with high remittances to differ from a country with low remittances with regard to GDP and net migration?

▲ **FIGURE 3-46 COLLECTING REMITTANCES IN TIMOR-LESTE**

▲ **FIGURE 3-47 HAITIANS COLLECTING REMITTANCES** Haitians wait in line outside a store in Tapachula, Mexico, to receive remittances sent from family members.



▶ **FIGURE 3-48 FLOW OF REMITTANCES** The United States and Saudi Arabia are the leading sources of remittances. Corridors with at least $5 billion in remittances are named.

Source: Pew Research Center

Political Reasons for Migrating

Learning Outcome 3.3.3 Explain political reasons for migrating.

People may be forced to migrate for political reasons. Political reasons are often classified as examples of forced migration because people may be compelled to leave a region because of religious or cultural persecution, civil war, genocide, an unstable government, disintegration of the rule of law, and similar dangerous circumstances.

Forced Political Migration

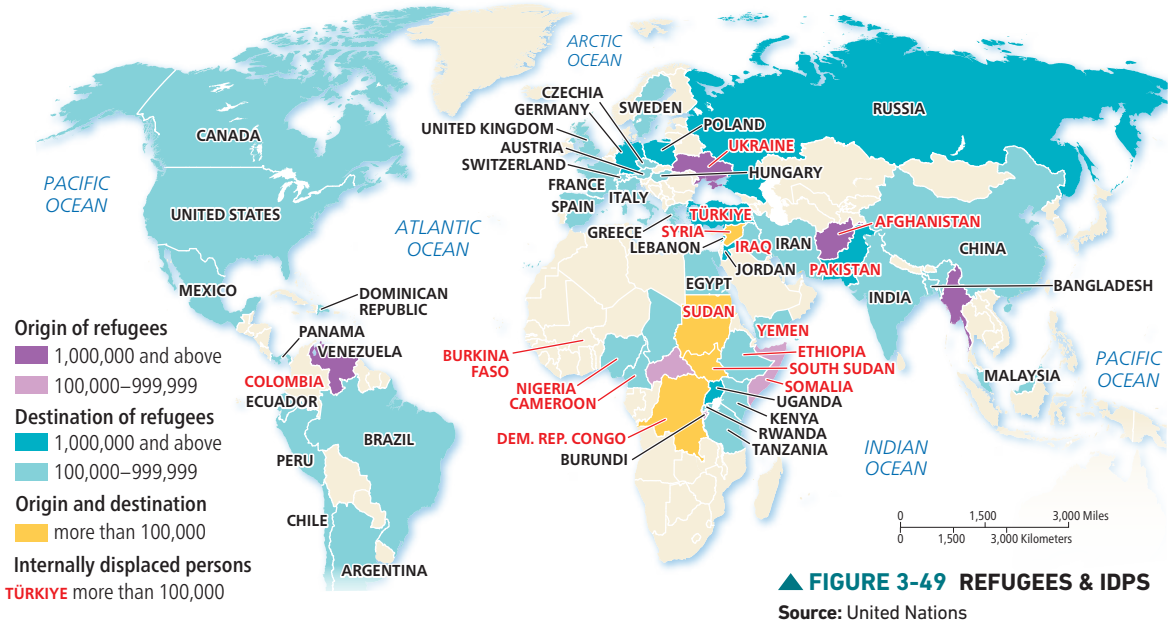
The United Nations High Commission for Refugees (UNHCR) recognizes three groups of people who are forced to migrate for political reasons (Figure 3-49):

- A **refugee** has been forced to migrate to another country to avoid the effects of armed conflict, situations of generalized violence, violations of human rights, or other disasters, and cannot return for fear of persecution because of race, religion, nationality, membership in a social group, or political opinion.
- An **asylum seeker** is someone who has migrated to another country in the hope of being recognized as a refugee.
- An **internally displaced person (IDP)** has been forced to migrate for similar political reasons as a refugee but has not migrated across an international border.

The United Nations counted around 45 million refugees, 53 million IDPs, and 5 million asylum seekers in 2022. The largest number of refugees in 2021 came from Syria, Venezuela, Afghanistan, South Sudan, and Myanmar. Ongoing civil wars in those countries cause this forced political migration. Neighboring countries received the most refugees. Refugees in Pakistan and Iran are primarily from Afghanistan, in Lebanon and Türkiye primarily from Syria, in Uganda and Ethiopia primarily from South Sudan, and in Bangladesh primarily from Myanmar. In 2022, the largest numbers of refugees came from Ukraine as a result of Russia's invasion (Figure 3-50). The largest number of Ukrainian refugees went to Poland, Germany, and Russia (Figure 3-51).

▲ **FIGURE 3-50 UKRAINIAN REFUGEES WAIT IN LINE TO GET INTO POLAND**

▲ **FIGURE 3-51 DESTINATION OF UKRAINIAN REFUGEES FROM RUSSIA'S INVASION**



▲ **FIGURE 3-49 REFUGEES & IDPS**

Source: United Nations

Forced Migration of Native Americans

Forced political migration occurred extensively in the United States during the nineteenth century. The victims were Native Americans. Like other people in North America, many Native Americans also migrated west in the nineteenth century. But their migration was forced rather than voluntary. Their route became known as the Trail of Tears; parts of it are preserved as a National Historic Trail (Figure 3-52).

This inequality was written in law, when the Indian Removal Act of 1830 authorized the U.S. Army to remove five Native American tribes from their land in the southeastern United States and move them to an area now included in the state of Oklahoma (Figure 3-53). The Choctaw were forced to emigrate from Mississippi in 1831, the Seminole from Florida in 1832, the Creek from Alabama in 1834, the Chickasaw from Mississippi in 1837 (Figure 3-54), and the Cherokee from Georgia in 1838.

The five removals opened up 100,000 square kilometers (25 million acres) of land for white people to settle and relocated the tribes to places that were too dry to sustain their traditional ways of obtaining food. Approximately 46,000 Native Americans were estimated to have been uprooted, and many of them died in the long trek to the west.

Pause & Reflect 3.3.3 What similarities and differences do you see in the migration patterns of Native Americans and those of the larger U.S. population over the past 230 years (refer to Figure 3-25 and Figure 3-53)?

FIGURE 3-52 TRAIL OF TEARS MEMORIAL The Memorial Passage sculpture in Chattanooga, Tennessee, marks the beginning of the forced journey of Cherokee Tribes west to Oklahoma.

FIGURE 3-53 TRAIL OF TEARS ROUTES

FIGURE 3-54 TRAIL OF TEARS MEMORIAL Statue of Princess Im-Mi-Ah-Key, the wife of Chickasaw Chief Tuscumbia, in Spring Creek Park, Tuscumbia, Alabama.

KEY ISSUE

3.4 | Why Do Migrants Face Challenges?

Transportation improvements, such as motor vehicles and airplanes, make it easier to migrate internationally. But the legal right to migrate from one country to another is tightly controlled by most countries.

Europe's Immigration Challenges

Learning Outcome 3.4.1 Describe patterns of immigration in Europe and issues resulting from the patterns.

Migration issues have been especially troubling for Europeans in recent years. The number of migrants has been increasing from other regions into Europe and between countries in Europe (Figures 3-55 and 3-56). The ease with which people are able to cross borders into Europe and among countries within Europe has been controversial.

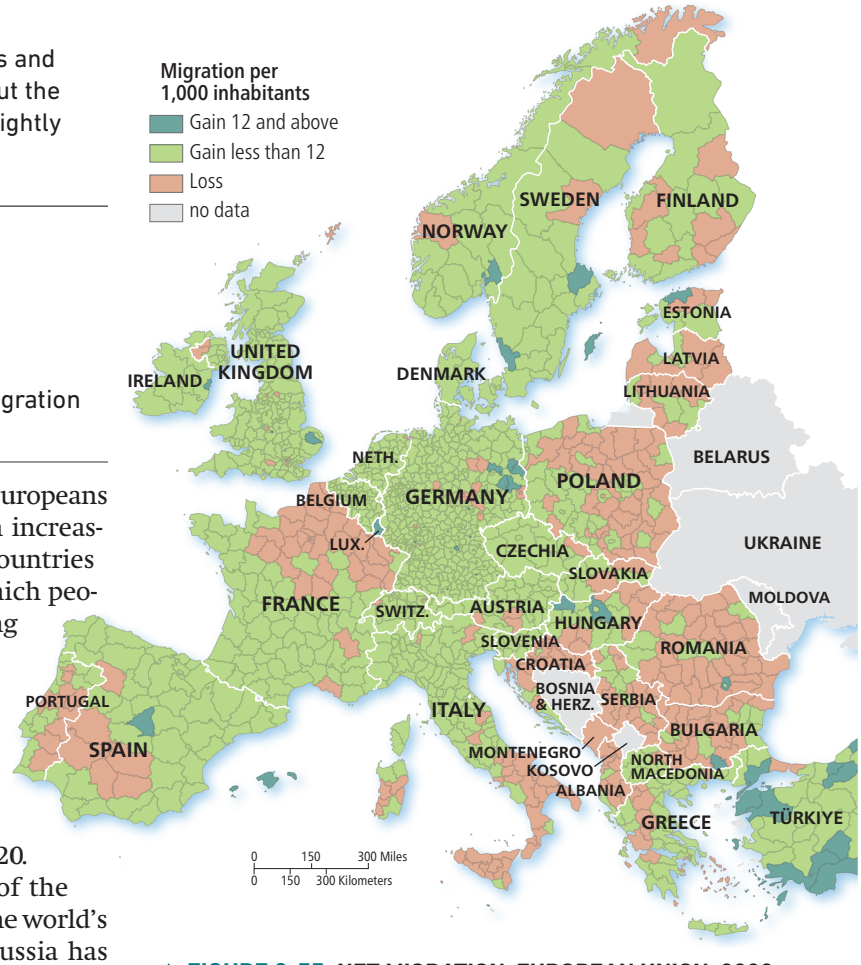
Internal Migration Patterns in Europe

Europe (including Russia) was home to 87 million of the world's 281 million immigrants as of 2020. Put another way, Europe has around 10 percent of the world's total population and around 30 percent of the world's migrants. Germany has 16 million immigrants, Russia has 12 million, the United Kingdom has 9 million, France has 9 million, Spain has 7 million, and Italy has 6 million.

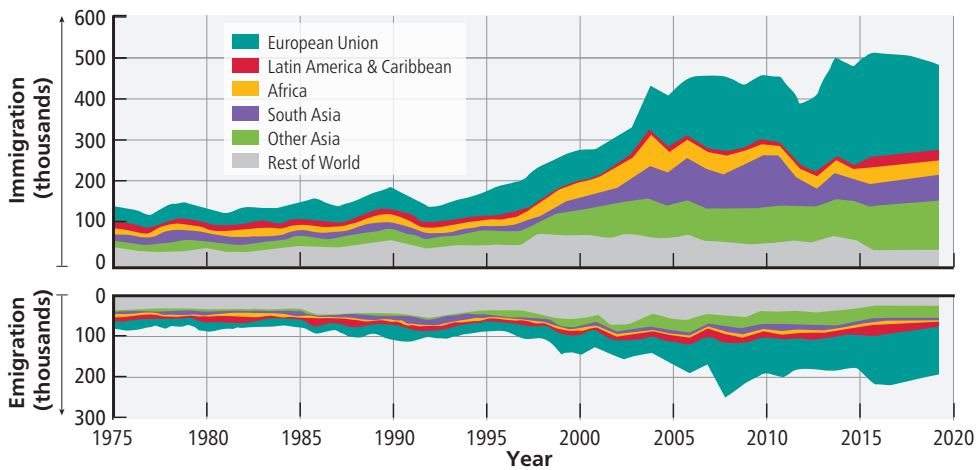
In Europe as a whole, around 10 percent of the region's population consists of immigrants. The foreign-born population is 48 percent in Luxembourg and 29 percent in Switzerland. Germany, the most populous country in Europe (other than Russia), not only has the largest number of immigrants, it also has one of the largest percentages of immigrants.

Europe's 87 million immigrants include 44 million originating in another European country and 43 million from other regions of the world, primarily from North Africa & Southwest Asia as well as Asian countries once part of the former Soviet Union. The general pattern of movement of migrants within Europe is from south and east to north and west. This pattern holds both for migrants born in a European country and for those originating from other regions of the world.

Pause & Reflect 3.4.1 What demographic characteristics of European countries justified policies allowing a certain amount of immigration? Why have European attitudes toward immigrants changed in recent years?



▲ **FIGURE 3-55 NET MIGRATION, EUROPEAN UNION, 2020** Most portions of Southern Europe and former communist countries of Central Europe have net out-migration. Most portions of Northern and Western Europe have net in-migration. The United Kingdom is included, although it is no longer in the European Union.
Source: Eurostat



▲ **FIGURE 3-56 NET MIGRATION, UNITED KINGDOM** Since the late twentieth century, the United Kingdom has had more immigration than emigration, especially from Europe and Asia.

Migrant Workers

Until recently, immigrants were regarded as useful additions to the labor force in Europe. With most European countries in stage 4 or 5 of the demographic transition, characterized by low or negative natural increase rate, immigrants took low-status and low-skill jobs that local residents didn't want to do. In cities such as Berlin, Brussels, Paris, and Zurich, immigrants provide essential services, such as driving buses, collecting garbage, repairing streets, and washing dishes.

Germany and other European countries once operated migrant worker programs, known at the time as **guest worker** programs, in which people from developing countries were allowed to immigrate temporarily to obtain jobs. They were protected by minimum-wage laws, labor union contracts, and other support programs. The guest worker programs, operated mainly during the 1960s and 1970s, were expected to be examples of **circular migration**, which is the temporary movement of a migrant worker between home and host countries to seek employment. Migrant workers were expected to return to their countries of origin once their work was done.

However, rather than circular migrants, many immigrants who arrived originally under the guest worker program have remained permanently in Europe (Figure 3-57). They, along with their children and grandchildren, have become citizens of the host country. The term *guest worker* is no longer used in Europe, and the government programs no longer exist.

Although relatively low paid by European standards, immigrants could earn far more than they would at home. By letting their people work elsewhere, the countries that immigrants left can reduce their level of unemployment. Immigrants also help their native countries by sending remittances back home to their families, who can then spend that money in their own countries.

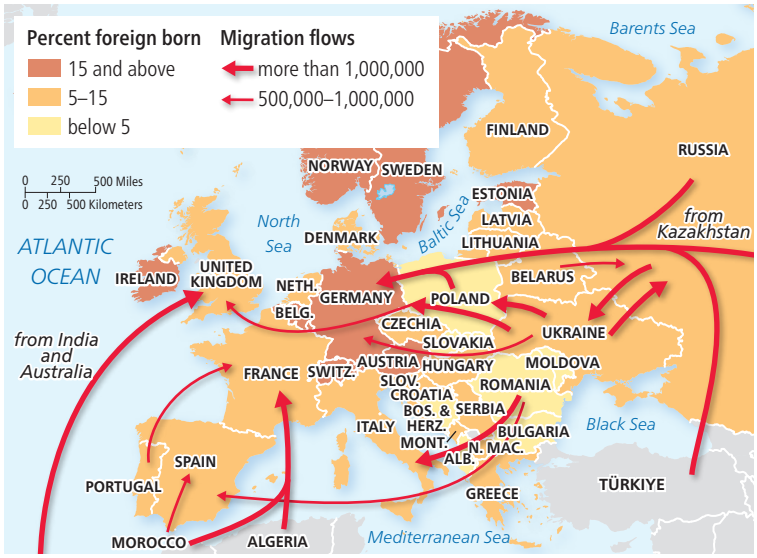
Ireland

The relative attractiveness of a region can shift with economic change. Ireland was a place of net out-migration through most of the nineteenth and twentieth centuries. Dire economic conditions produced net out-migration in excess of 200,000 a year during the 1850s. The pattern reversed during the 1990s, as economic prosperity made Ireland a destination for immigrants, especially from Eastern Europe. The severe global recession in 2008–2009 brought a return to net out-migration. However, an improving economy has again brought net in-migration back to Ireland in recent years (Figure 3-58).

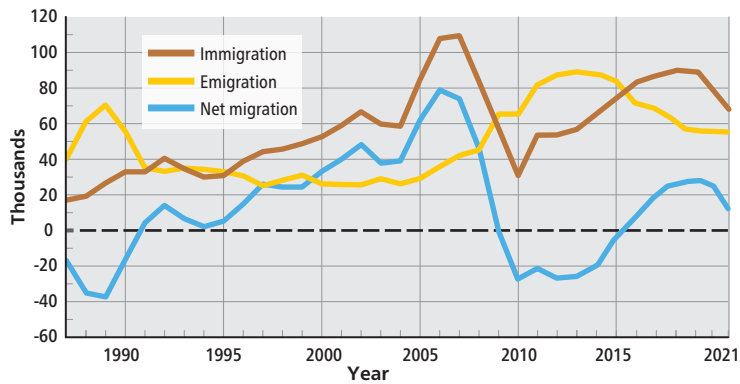
Attitudes Toward Immigrants

Hostility to immigrants has become a central plank in the platform of political parties in many European countries. These parties blame immigrants for crime, unemployment, and high welfare costs. Above all, the anti-immigration parties fear that long-standing cultural traditions of the host country are threatened by immigrants who adhere to different religions, speak different languages, and practice different food and other cultural habits. From the standpoint of these parties, immigrants represent a threat to the centuries-old cultural traditions of the host country.

Anti-immigrant attitudes in Europe have been heightened with the arrival of more than 1 million refugees from Asia since 2015. Most of these refugees have come from Syria, Afghanistan, and Iraq. These refugees were escaping from threats of murder, rape, torture, and loss of property in their home countries. Compounding the tensions, the vast majority of the unauthorized immigrants were Muslims arriving in predominantly Christian Europe during the same time as a series of terrorist attacks in Europe were carried out by supporters of radical Muslim organizations (see Chapter 8). On the other hand, neighboring countries have welcomed the arrival of some 14 million refugees from Ukraine in the wake of Russia's invasion in 2022.



▲ **FIGURE 3-57 IMMIGRATION IN EUROPE**
Source: Eurostat



▲ **FIGURE 3-58 NET MIGRATION, IRELAND**

Quotas

Learning Outcome 3.4.2 Explain the role of quotas in U.S. immigration policies.

To regulate migration, a government may enact a **quota,** which is a law establishing a maximum limit on the number of people who can immigrate into a country. Prior to the twentieth century, the United States did not have quotas. Since the passage of the Emergency Quota Act in 1921, the United States has had quotas.

U.S. Quota Acts

The Emergency Quota Act restricted the number of immigrants admitted to the United States from any country annually to 3 percent of the number of residents from that same country living in the United States in 1910. Limits were not set for professional workers and for citizens of Latin American countries. The quotas ensured that most immigrants to the United States after 1910 would come from Northern and Western Europe because those were the regions from which most U.S. immigrants came before that year. Quotas were enacted following recommendations of the Dillingham Commission, which had been set up by Congress in 1907 to investigate the effects of immigration. The commission's 40-volume report noted a shift (displayed in Figure 3-13) in the principal source of immigrants to the United States, from Northern and Western Europe to Southern and Eastern Europe (Figure 3-59). The report reflected the attitudes of many Americans at the time when it claimed that immigrants from Southern and Eastern Europe were "inclined toward violent crime," resisted assimilation, and "drove old-stock citizens out of some lines of work." (Some Americans now use similar language to attack recent immigrants.) Prior to the 1921 Quota Act, several other acts in the late nineteenth and early twentieth centuries had restricted the number of Chinese people allowed into the United States.

▼ **FIGURE 3-59 IMMIGRANTS ARRIVING IN THE UNITED STATES FROM GERMANY, 1906**

Since the 1921 Quota Act, key modifications in the U.S. quotas have included the following:

- **1924.** For each country that had native-born persons already living in the United States, 2 percent of their number (based on the 1910 census) could immigrate each year. This ensured that most immigrants would come from Europe.
- **1965.** Quotas for individual countries were replaced with hemisphere quotas (170,000 from the Eastern Hemisphere and 120,000 from the Western Hemisphere).
- **1978.** A global quota of 290,000 was set, including a maximum of 20,000 per country.
- **1990.** The global quota was raised to 700,000, including a maximum of 7 percent per country.

Skill- & Family-Based Migration

Because the number of applicants for admission to the United States far exceeds the quotas, Congress has set preferences:

- **Family reunification.** Approximately three-fourths of immigrants are admitted to reunify families, primarily spouses or unmarried children of people already living in the United States.
- **Skilled workers.** Exceptionally talented professionals receive most of the remainder of the quota.
- **Diversity lottery.** A few immigrants are admitted by lottery under a diversity category for people from countries that historically sent few people to the United States.

Quota restrictions do not apply to refugees, who may be admitted once their refugee status is verified. Also admitted without limit are spouses, children, and parents of U.S. citizens. The number of immigrants into the United States can vary sharply from year to year, primarily because of fluctuations in these two groups.

By giving preference to skilled workers, immigration policies in the United States as well as similar policies in other developed countries contribute to a large-scale emigration by talented people, a process known in some developing countries as a **brain drain**. When scientists, researchers, doctors, and other professionals immigrate to developed countries, the countries from which they emigrated could then be left with shortages of skilled professionals.

Asians have made especially good use of the priorities set by the U.S. quota laws. Many well-educated Asians enter the United States under the U.S. quota preference for skilled workers. Once admitted, they can bring in relatives under the family reunification provisions of the law. Eventually, these immigrants can bring in a wider range of other relatives from Asia through a process of **family-based migration**, which is the migration of people to a specific location because relatives previously migrated there.

Pause & Reflect 3.4.2 What aspects of current U.S. immigration policy depart from a strict quota system? Over time, how does this affect the makeup of the country's immigrant population?

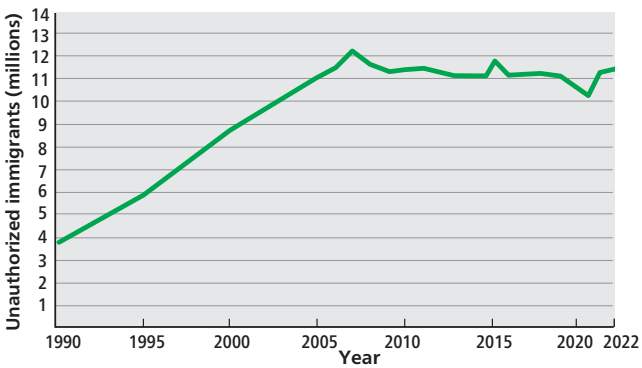
Unauthorized Immigration

The number of people allowed to immigrate into the United States is at a historically high level, but the number who wish to come is even higher. Many who cannot legally enter the United States immigrate illegally. Those who do so are entering without proper documents and thus are called **unauthorized immigrants**. The principal reason for unauthorized immigration to the United States is to seek a job. *Unauthorized immigrant* is the term preferred by academic observers, including the authoritative Pew Hispanic Center, as a neutral term. *Undocumented immigrant* is the term preferred by some of the groups that advocate for more rights for these individuals.

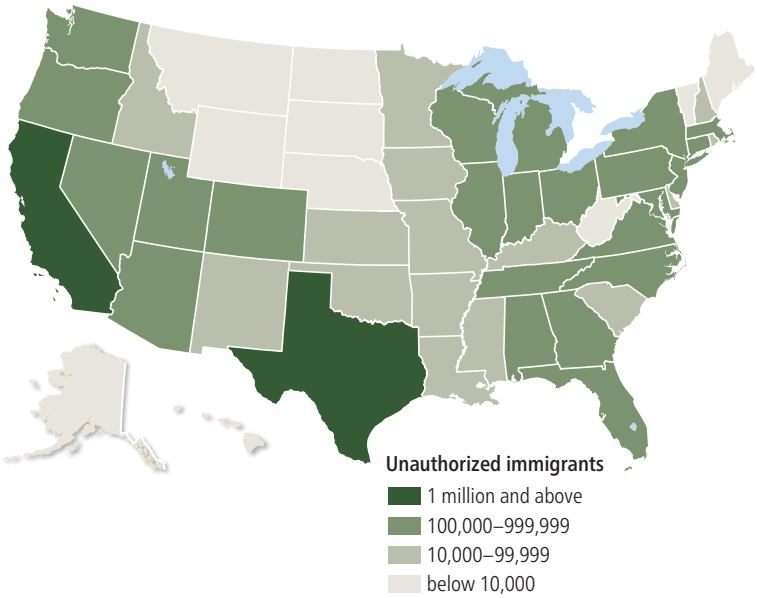
Several organizations concerned with immigration estimate that between 11.0 and 11.5 million unauthorized immigrants currently live in the United States. The number increased rapidly between 1990 and 2005 (Figure 3-60). After hitting a peak of nearly 12 million in 2007, the number declined because of reduced job opportunities in the United States during the severe recession in 2008–2009. Since then, the number of unauthorized immigrants in the United States has remained steady at around 11 million.

Other information about unauthorized immigrants in the United States is provided by the Pew Hispanic Center, the Migration Policy Institute, and the U.S. Census:

- **Source country.** Around 48 percent of the 11 million unauthorized immigrants to the United States came from Mexico. The share of unauthorized immigrants coming from Mexico has decreased in recent years. The remaining share of unauthorized immigrants to the United States were about evenly divided between other Latin American countries and other regions of the world.
- **Destination.** An estimated 24 percent live in California and 11 percent in Texas (Figure 3-61).
- **Children.** The 11 million unauthorized immigrants include 1 million children (Figure 3-62). In addition, while living in the United States, unauthorized immigrants have given birth to approximately 4.4 million babies, who, because they are born in the United States, are legal U.S. citizens. The Deferred Action for Childhood Arrivals (DACA) was a policy that President Obama established by executive order in 2012, President Trump rescinded in 2017, and President Biden restored in 2021. DACA has permitted 650,000 children brought to the United States as unauthorized immigrants to remain in the United States legally, as of 2021.
- **Years in the United States.** Around 22 percent of unauthorized immigrants have lived in the United States for less than 5 years and 22 percent for at least 20 years. The duration of residency in the United States has been increasing for unauthorized immigrants.
- **Labor force.** Approximately 7 million unauthorized immigrants were employed in the United States, accounting for around 4 percent of the total U.S. civilian labor force. Unauthorized immigrants were much more likely than the average American to be employed in construction and hospitality (food service and lodging) jobs and less likely to be in white-collar jobs such as education, health care, and finance.



▲ **FIGURE 3-60 UNAUTHORIZED IMMIGRANTS IN THE UNITED STATES**
Source: Pew Hispanic Center



▲ **FIGURE 3-61 DISTRIBUTION OF UNAUTHORIZED IMMIGRANTS**
The largest numbers are in California and Texas.
Source: Migration Policy Institute

▲ **FIGURE 3-62 UNAUTHORIZED IMMIGRANT CHILDREN** Mother and children in U.S. Border Patrol custody after trying to cross into the United States.

U.S.–Mexico Border Issues

Learning Outcome 3.4.3 Summarize the diversity of conditions along the U.S.–Mexico border.

The U.S.–Mexico border is 3,145 kilometers (1,954 miles) long. Several large urban areas are situated on the border, including San Diego, California, and Tijuana, Mexico, at the western end, and Brownsville, Texas, and Matamoros, Mexico, at the eastern end.

Driving across the border in the urban areas can be fraught with heavy traffic and delays. Elsewhere, the border runs mostly through sparsely inhabited areas. Rural areas and small towns are sometimes guarded by only a handful of agents. Crossing the border on foot legally is possible in several places.

A joint U.S.–Mexican International Boundary and Water Commission is responsible for keeping official maps, on the basis of a series of nineteenth-century treaties. The commission is also responsible for marking the border by maintaining 276 6-foot-tall iron monuments erected in the late nineteenth century, as well as 440 15-inch-tall markers added in the 1970s. Actually locating the border is difficult in some remote areas.

The Secure Fence Act of 2006 funded construction of 1,125 kilometers (700 miles) of barriers along the U.S.–Mexico border (Figure 3-63). By 2011, 1,044 kilometers (649 miles) had been built. President Trump signed an executive order in 2017 to construct a border wall. During its four years in office, President Trump's administration constructed 79 kilometers (49 miles) of new barriers and 648 kilometers (403 miles) of replacements for existing barriers. Another 356 kilometers (221 miles) were under construction and 253 kilometers (157 miles) were in pre-construction planning when President Trump left office in January 2021 (Figure 3-64).

FIGURE 3-63 U.S.–MEXICO BORDER FENCE, ARIZONA

Border Disputes

Americans are divided concerning whether unauthorized migration helps or hurts the country. This ambivalence extends to specific elements of immigration as reported by the Pew Hispanic Center:

- **Border security.** A majority of Americans would like more effective border patrols so that fewer unauthorized immigrants can get into the country. However, a majority oppose spending money to build more fences along the border. Since 2010, the U.S. Department of Homeland Security has compulsory deported an average of more than 360,000 unauthorized immigrants annually, and another 200,000 unauthorized immigrants have been confirmed to have departed annually.
- **Workplace.** Most Americans recognize that unauthorized immigrants take jobs that no one else wants, so they support some type of work-related program to make those undocumented immigrants legal citizens, and they oppose raids on workplaces in attempts to round up unauthorized immigrants. Most Americans support a path to U.S. citizenship for unauthorized immigrants.
- **Civil rights.** Americans favor letting law enforcement officials stop and verify the legal status of anyone they suspect of being an unauthorized immigrant. On the other hand, they fear that enforcement efforts that identify and deport unauthorized immigrants could violate the civil rights of both U.S. citizens and noncitizens.
- **Local initiatives.** Polls show that most Americans believe that enforcement of unauthorized immigration is a federal government responsibility and do not support the use of local law enforcement officials to find unauthorized immigrants. On the other hand, residents of some U.S. states along the Mexican border favor stronger enforcement of immigration laws.

FIGURE 3-64 BORDER WALL, CIUDAD JUAREZ, MEXICO A section of the 356 kilometers under construction in January 2021, the month that President Trump left office.

Diverse Border Crossings

The 50 pedestrian and vehicle border crossings between the United States and Mexico look very different depending on where one is trying to cross (Figure 3-65). Compare conditions for pedestrians and vehicles at different U.S–Mexico incoming border crossings.

- When driving across the border in urban areas, such as between San Diego and Tijuana, motorists can encounter heavy traffic (Figure 3-66).
- Where the border runs between adjacent small towns, such as between Columbus, New Mexico, and Puerto Palomas, Chihuahua, pedestrians and motorists are rarely slowed down (Figure 3-67).
- Crossing the border by ferry is possible between Los Ebanos, Texas, and Gustavo Díaz Ordaz, Tamaulipas (Figure 3-68).
- The Rio Grande River is easy for migrants to cross in places such as from Ciudad Juarez, Mexico, to El Paso, Texas, if they are able to evade the authorities (Figure 3-69).

Pause & Reflect 3.4.3 Why at border crossings is traffic entering the United States backed up farther than traffic entering Mexico?

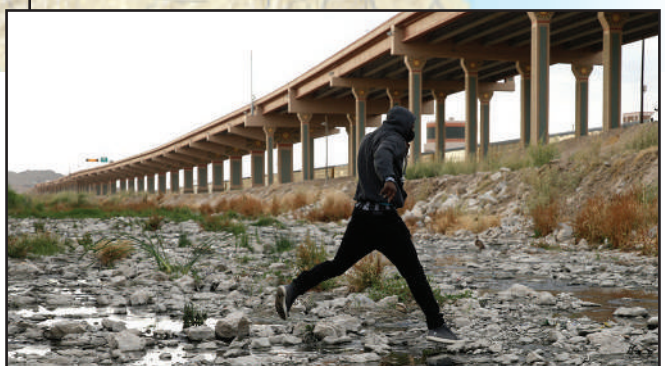
▼ **FIGURE 3-66** U.S.–MEXICO BORDER: SAN DIEGO AND TIJUANA

▼ **FIGURE 3-68** U.S.–MEXICO BORDER: LOS EBANOS AND GUSTAVO DÍAZ ORDAZ

▼ **FIGURE 3-65** U.S.–MEXICO BORDER

▼ **FIGURE 3-67** U.S.–MEXICO BORDER: COLUMBUS AND PUERTO PALOMAS

▼ **FIGURE 3-69** U.S.–MEXICO BORDER: EL PASO AND CIUDAD JUAREZ



3 Summary & Review

KEY ISSUE

3.1 | Where Are Migrants Distributed?

- Migration is the permanent move to a new location.
- Migration can be international (voluntary or forced) or internal (interregional or intraregional).
- The number and places of origin of immigrants to the United States have varied over time.
- Most migrants are young adults.

KEY ISSUE

3.2 | Where Do People Migrate Within Countries?

- Large-scale interregional migration has resulted in the movement of the U.S. center of population to the west and south.
- Other large countries experience substantial interregional migration.
- Intraregional migration is primarily from rural to urban areas in developing countries and from cities to suburbs in developed countries.

KEY ISSUE

3.3 | Why Do People Migrate?

- People migrate for a combination of political, environmental, and economic push and pull factors.
- Most people migrate in search of work.

KEY ISSUE

3.4 | Why Do Migrants Face Challenges?

- Immigration is tightly controlled by most countries.
- The United States has around 11 million unauthorized immigrants, around half from Mexico.
- Americans and Europeans are divided on attitudes toward immigrants.

Thinking Geographically

KEY ISSUE

3.1 | Where Are Migrants Distributed?

What might be the impact of emigration on the country from which migrants departed?

▶ FIGURE 3CR-1 DESERTED VILLAGE, MEXICO

KEY ISSUE

3.2 | Where Do People Migrate Within Countries?

Has your community experienced net in-migration or net out-migration in recent years? What factors might explain your community's net migration?

▲ FIGURE 3CR-2 MOVING DAY

KEY ISSUE

3.3 | Why Do People Migrate?

At some point in the future, do you expect to migrate? If so, do you expect to undertake international, interregional, or intraregional migration? Why?

▶ FIGURE 3CR-3 GRADUATION DAY

KEY ISSUE

3.4 | Why Do Migrants Face Challenges?

The number of unauthorized immigrants from Mexico to the United States has been declining since 2007. Given the push and pull factors underlying people's reasons for migrating, what might account for this decline?

▲ FIGURE 3CR-4 BARRIER BETWEEN SAN DIEGO, CALIFORNIA, AND TIJUANA, MEXICO

Key Terms

Asylum seeker Someone who has migrated to another country in the hope of being recognized as a refugee.

Brain drain Large-scale emigration by talented people.

Circular migration The temporary movement of a migrant worker between home and host countries to seek employment.

Circulation Short-term, repetitive, or cyclical movements that recur on a regular basis.

Counterurbanization Net migration from urban to rural areas in developed countries.

Emigration Permanent movement of people from a location.

Family-based migration Migration of people to a specific location because relatives previously migrated there.

Floodplain The area subject to flooding during a given number of years, according to historical trends.

Forced migration Permanent movement of people compelled by political or environmental factors.

Guest worker A term once used for a worker in search of a higher-paying job who migrated to the developed countries of Northern and Western Europe, usually from Southern and Eastern Europe or from North Africa.

Immigration Permanent movement of people to a new location.

Internal migration Permanent movement of people within a particular country.

Internally displaced person (IDP) Someone who has been forced to migrate for similar political reasons as a refugee but who has not migrated across an international border.

International migration Permanent movement of people from one country to another.

Interregional migration Permanent movement of people from one region of a country to another.

Intervening obstacle An environmental or cultural feature of the landscape that hinders migration.

Intraregional migration Permanent relocation of people within one region of a country.

Migration A form of relocation diffusion involving permanent relocation of people to a new location.

Migration transition A change in the pattern of movement of people in a society that results from industrialization, population growth, and other social and economic changes that also produces the demographic transition.

Mobility All types of movements of people between locations.

Net migration The difference in a given place between the level of immigration and the level of emigration.

Pull factor A reason that induces people to move to a new location.

Push factor A reason that induces people to leave old locations.

Quota In reference to migration, a law that places maximum limits on the number of people who can immigrate to a country each year.

Refugee Someone who is forced to migrate from their home country and who cannot return to that home country for fear of persecution because of race, religion, nationality, membership in a social group, or political opinion.

Remittance Transfer of money by migrant workers from the country into which they immigrated to people in the country from which they emigrated.

Step migration Movement of people that follows a path of a series of stages or steps toward a final destination.

Unauthorized immigrant A person who enters a country without proper documents to do so.

Voluntary migration Permanent movement of people undertaken by choice.

International Geographic Mapping Explorations

U.S.–Mexico Border

The border between the United States and Mexico encompasses many landscapes, including mountains, rivers, and drylands. The border region between Sasabe, Arizona, and Sasabe, Mexico, is an example of dryland.

▲ **FIGURE 3CR-5 U.S.–MEXICO BORDER NEAR SASABE, ARIZONA, AND SASABE, MEXICO**

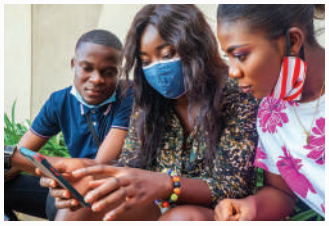
. . . . When people migrate—whether international or internal, voluntary or forced—they bring their cultural values with them, a form of relocation diffusion. Increasingly, though, the distribution of cultural values is influenced by processes of expansion diffusion, especially through the growth of social media, as we will see in the next chapter, Culture & Social Media. . . .

4 Culture & Social Media

KEY ISSUES

4.1 Where Are Cultural Activities Distributed?

Compared to folk culture, popular culture activities are more likely to originate at a specific time and place and to diffuse over a wider region. Diffusion of contemporary culture is facilitated by electronic communications and social media.



4.2 Why Might Culture Diffuse?

Material folk culture, including food, shelter, and clothing, as well as leisure and recreation activities, is more likely to vary between places, whereas popular culture is more likely to vary between points in time.

4.3 Why Is Access to Culture Unequal?

Popular culture is increasingly likely to diffuse through electronic media. People in some regions lack access to electronic media.

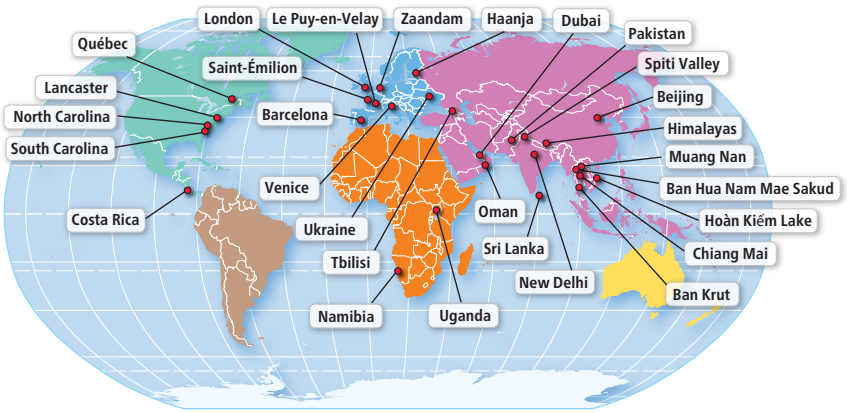
4.4 Why Do Cultures Face Sustainability Challenges?

Although popular culture tends to produce uniform landscapes, differences in cultural preferences persist among people in different regions.

▶ Cricket tournament, Baramulla, India.

Culture is the body of material traits, customary beliefs, and social forms that together contribute to the distinct identity of a group of people. Chapter 4 focuses on the first part of this definition (material traits)—the visible elements that a group possesses and leaves behind for the future. In our globalized world, cultures can change rapidly as ideas, fashions, and trends of all kinds diffuse on social media. Many people, however, also maintain features of their traditional cultures.

LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

4.1 | Where Are Cultural Activities Distributed?

Culture was defined in Chapter 1 as the body of material possessions, customary beliefs, and social norms that together constitute the distinct tradition of a group of people. Geographers are interested in all three components of the definition.

Culture, Social Media, & Geography

Learning Outcome 4.1.1 Outline concepts of folk and popular culture.

Understanding geographic patterns of material possessions, customary beliefs, and social norms of a group of people follows logically from the discussion of migration in Chapter 3. Because people bring along their cultural identity when they migrate, people living in two different places may have similar material possessions, customary beliefs, and social norms. Differences emerge over time if groups living in two different places experience different processes of assimilation, acculturation, and syncretism.

Geographers search for where various elements of culture are found in the world and for reasons why the observed distributions occur. How does culture influence behavior?

- Chapter 4 focuses on material possessions – the visible elements that a group possesses and leaves behind for the future.
- Chapters 5 and 6 examine two important components of a group's values and beliefs – language and religion.
- Chapters 7 and 8 look at two social norms and constructs (ethnicity and political institutions) that maintain the group's values and protects its material traits.

Geography & Culture

Geographers divide culture into two types:

- **Folk culture** is traditionally practiced primarily by small, homogeneous groups living in isolated rural areas.
- **Popular culture** is found in large, heterogeneous societies that share certain habits despite differences in other personal characteristics.

Each cultural element has a distinctive origin, diffusion, and distribution. Geographers observe that folk culture and popular culture typically differ in their processes of origin, diffusion, and distribution.

Geographers distinguish between habit and custom:

- A **habit** is a repetitive act that a particular individual performs, such as wearing jeans to class every day.
- A **custom** is a repetitive act of a group, performed to the extent that it becomes characteristic of the group, such as many students typically wearing jeans to class.

Unlike custom, habit does not imply that the act has been adopted by most of the society's population. A custom is therefore a habit that has been widely adopted by a group of people.

A collection of social customs produces a group's material culture; for example, jeans are a badge of youth that typically represent American informality. In this chapter, custom may be used to denote a specific element of material culture, such as an American's use of smartphones, whereas culture refers to a group's entire collection of customs, such as the American celebrations of Martin Luther King, Jr. Day, Independence Day, Thanksgiving, and other national holidays.

Geography & Social Media

Popular culture diffuses rapidly around the world in the twenty-first century primarily through electronic media. Social media and electronic devices make it easier for people to interact across the distance of space with friends and businesses.

Social media has also made it possible for people to communicate during times of crisis. During Russia's war against Ukraine in 2022, for example, Ukrainians were able to stay in touch to learn the progress of the war and check on the safety of friends and relations (Figure 4-1). Russia's invasion of Ukraine demonstrated that the strategy of fighting a war with twentieth-century firepower could be met with twenty-first century electronic responses, such as cutting off Russia's access to electronic networks of financial institutions that connect to the rest of the world.

▲ **FIGURE 4-1 SOCIAL MEDIA IN WAR** Social media enabled Ukrainians to stay in touch with the latest events in Russia's invasion of and war against Ukraine, even while forced into basements and shelters to survive Russian bombardments.

Folk & Popular Culture

Two elements of culture are emphasized in this chapter:

- **Daily necessities of food, clothing, and shelter.** All people must consume food, wear clothing, and find shelter, but different cultural groups do so in distinctive ways.
- **Leisure activities, such as arts and recreation.** Each cultural group has its own definition of meaningful art and stimulating recreation. For example, people in the United States and Pakistan do not allocate their leisure time in the same way (Figure 4-2).

Geographic Processes Underlying Folk & Popular Culture

The geographic processes underlying folk culture and popular culture differ. The region covered by a folk culture is typically much smaller than that covered by a popular culture. A group's distinctive culture derives from experiencing local social and physical conditions in a place that is isolated from other groups. Even groups living in close proximity to one another may adopt different folk cultures because of limited connections.

An example of distinctive local culture is the wide variation in barbecue styles within the United States (Figure 4-3). Four major barbecue styles include two relatively old styles – Carolina and Memphis – which use pork, and two more recently evolved styles – Kansas City and Texas – which use beef as well as pork. Meats other than pork and beef can be found elsewhere, such as lamb and mutton in Kentucky (Figure 4-4).

Landscapes dominated by folk culture change relatively little over time. In contrast, popular culture is based on rapid simultaneous global connections through communications systems, transportation networks, and other modern technology. Rapid diffusion facilitates frequent changes in popular culture. Thus, folk culture is more likely to vary from place to place at a given time, whereas popular culture is more likely to vary from time to time at a given place.

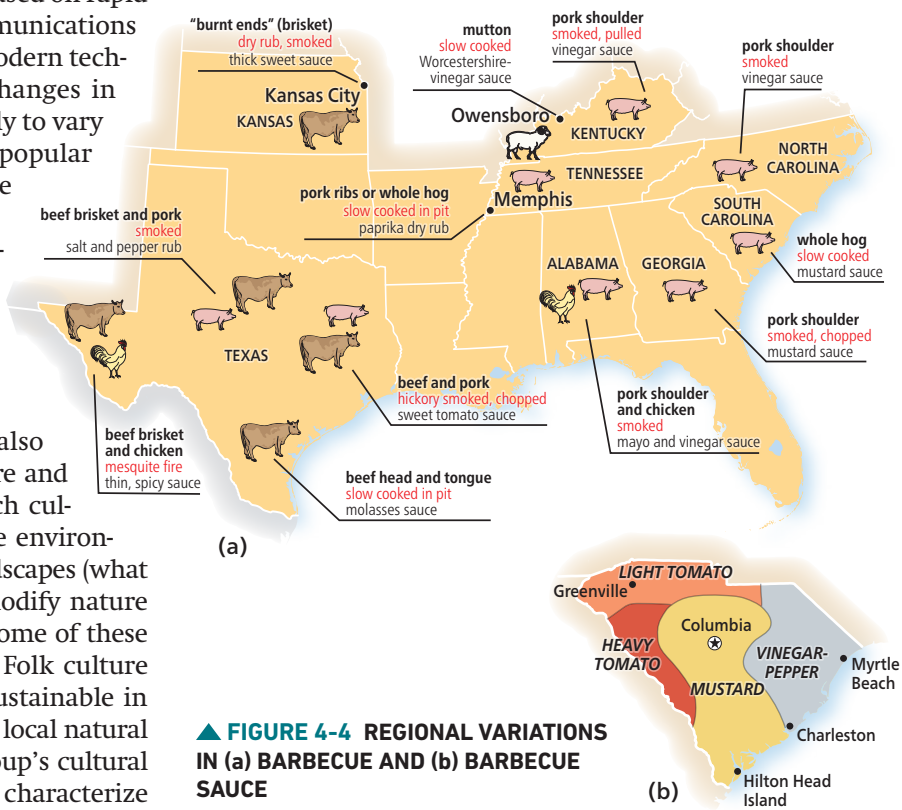
At a global scale, popular culture is becoming more dominant, threatening the survival of unique folk culture. The disappearance of local folk culture reduces local diversity in the world and the intellectual stimulation that arises from differences in backgrounds.

The dominance of popular culture can also threaten the quality of the environment. Culture and the physical environment are interrelated. Each cultural group takes particular elements from the environment into its culture and in turn constructs landscapes (what geographers call "built environments") that modify nature in distinctive ways. As discussed in Chapter 1, some of these landscapes are sustainable, and some are not. Folk culture derived from local natural elements may be sustainable in that the protection and enhancement of unique local natural elements may be an essential feature of the group's cultural values and beliefs. The material elements that characterize popular culture may be less likely to reflect concern for the sustainability of the physical environment.

Pause & Reflect 4.1.1 If you eat barbecue, which regional variation do you prefer?

▲ **FIGURE 4-2 LEISURE ACTIVITIES** Playing cricket, Pakistan.

▶ **FIGURE 4-3 MATERIAL CULTURE** Cooking barbecue, North Carolina.



▲ **FIGURE 4-4 REGIONAL VARIATIONS IN (a) BARBECUE AND (b) BARBECUE SAUCE**

Elements of Cultural Geography

Learning Outcome 4.1.2 Compare processes of origin, diffusion, and distribution of folk and popular culture.

Each cultural element has a unique spatial distribution, but in general, distribution is more extensive for popular culture than for folk culture. Two basic factors help explain the different spatial distribution of popular and folk cultures – the process of origin and the pattern of diffusion.

Origin of Culture

Culture originates at a hearth, which was defined in Chapter 1 as a place from which innovation originates.

- Folk culture often has anonymous hearths, originating from anonymous sources, at unknown dates, through unidentified originators. It may also have multiple hearths, originating independently in isolated locations.
- Popular culture is typically traceable to a specific person or corporation in a particular place. It is most often a product of developed countries, especially in North America and Europe.

Popular music and other elements of popular culture, such as food and clothing, arise from a combination of advances in industrial technology and increased leisure time. Industrial technology permits the uniform reproduction of objects in large quantities (iPads, T-shirts, pizzas). Many of these objects help people enjoy leisure time, which has increased as a result of the widespread change in the labor force from predominantly agricultural work to predominantly service and manufacturing jobs.

For example, BTS, also known as the Bangtan Boys, is a South Korean boy band that was formed in 2010 by Bang Si-hyuk, the CEO of Big Hit Entertainment (Figure 4-5). The group originally featured hip hop music, which in turn is considered to have originated on August 11, 1973, at 1520 Sedgwick Avenue, in New York City's Bronx Borough, during a block party with DJ Kool Herc, whose birth name was Clive Campbell. However, Bang Si-hyuk decided to recast BTS as an idol group.

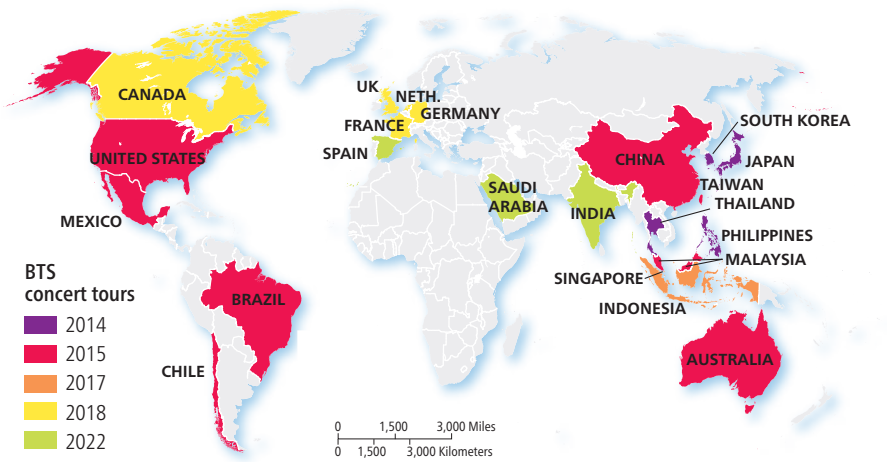
Diffusion of Culture

Folk and popular cultures go through different processes of diffusion. Folk culture is transmitted from one location to another relatively slowly and on a small scale, primarily through relocation diffusion (migration). Popular culture typically spreads through a process of hierarchical diffusion, diffusing rapidly and extensively from hearths or nodes of innovation with the help of modern communications.

For example, BTS embarked on its first concert tour outside South Korea in 2014 in Japan. Its second concert tour extended to other countries in Asia as well as North America and South America. The group reached Europe in 2016 (Figure 4-6).

Meanwhile, hip hop music diffused from the Bronx to nearby Philadelphia during the 1970s and to other U.S. cities during the 1980s. The music was introduced into Western Europe and Japan and diffused back to Caribbean countries, a principal source of inspiration. In more recent decades, hip hop reached Latin America, Asia, and Africa, where local cultural styles influenced the music from the original Bronx hearth. Meanwhile, as sometimes occurs with popular culture, as the style diffuses around the world, it can become less important in its hearth. In fact, sales of hip hop music declined sharply in the United States starting in 2005. However, alternative hip hop, which also originated in the East Coast, has become more popular instead.

▲ **FIGURE 4-5 ORIGIN OF POPULAR CULTURE** The band BTS was created by the head of an entertainment company.



▲ **FIGURE 4-6 DIFFUSION OF POPULAR CULTURE** BTS concert tours originated in South Korea, diffused first to other Asian countries and then to other regions of the world.

Distribution of Culture

Popular culture is distributed widely across many countries, with little regard for physical factors. The distribution is influenced by the ability of people to access the content. The principal obstacle to access is lack of income to purchase the content.

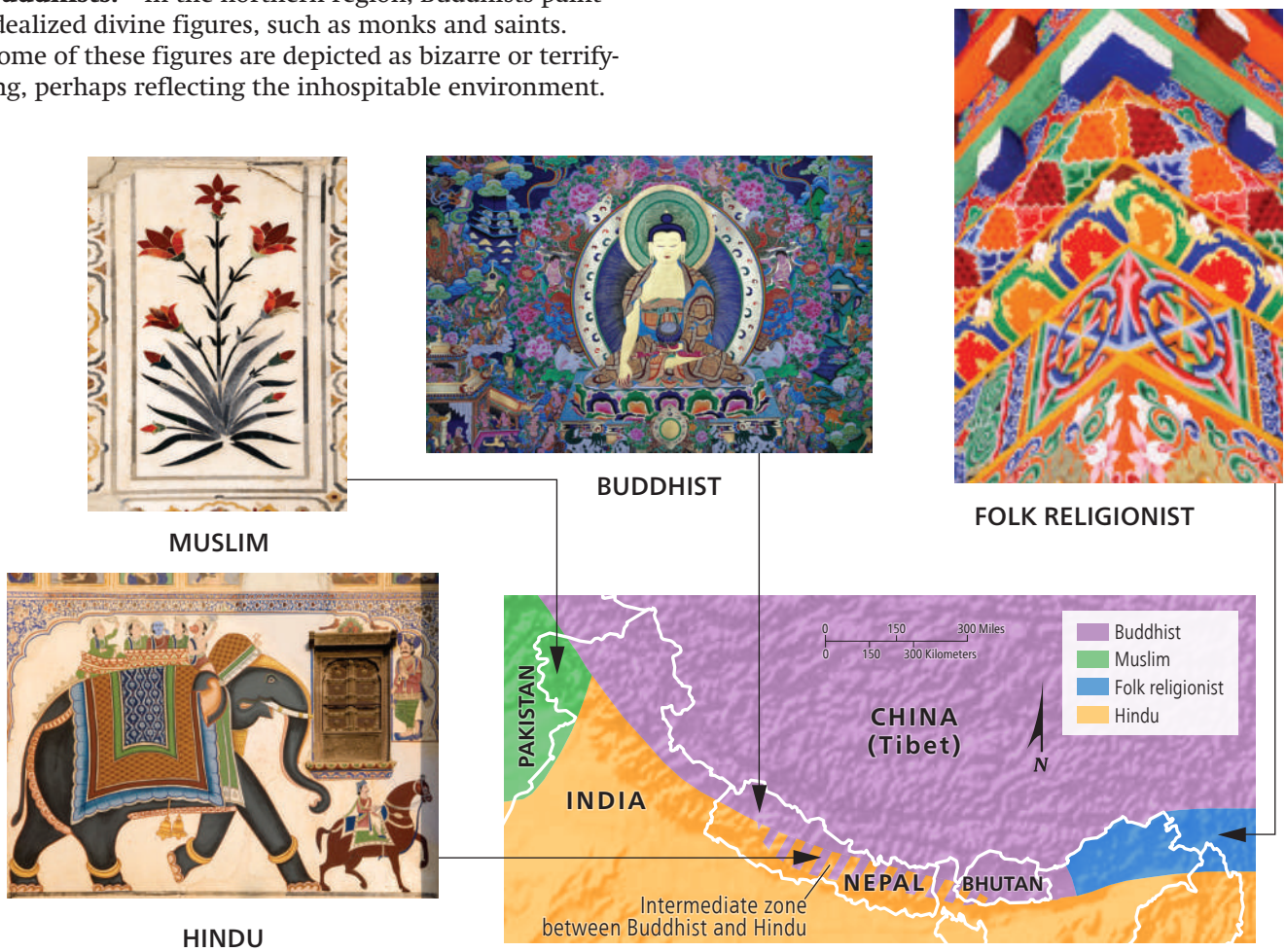
A combination of local physical and cultural factors influences the distinctive distributions of folk culture. For example, in a study of artistic customs in the Himalaya Mountains, geographers P. Karan and Cotton Mather revealed that distinctive views of the physical environment emerge among neighboring cultural groups that are isolated. The study area, a narrow corridor of 2,500 kilometers (1,500 miles) in the Himalaya Mountains of Bhutan, Nepal, northern India, and southern Tibet (China), contains four religious groups: Tibetan Buddhists in the north, Hindus in the south, Muslims in the west, and Southeast Asian folk religionists in the east (Figure 4-7). Despite their spatial proximity and because of limited interaction, these groups produce distinctive folk customs.

Through its choices of subjects of paintings, each group reveals how its culture reflects the religions and individual views of the group's environment:

- **Buddhists.** In the northern region, Buddhists paint idealized divine figures, such as monks and saints. Some of these figures are depicted as bizarre or terrifying, perhaps reflecting the inhospitable environment.
- **Hindus.** In the southern region, Hindus create scenes from everyday life and familiar local scenes. Their paintings sometimes portray a deity in a domestic scene and frequently represent the region's violent and extreme climatic conditions.
- **Muslims.** To the west, folk art is inspired by the region's beautiful plants and flowers. In contrast with the paintings from the Buddhist and Hindu regions, these paintings do not depict harsh climatic conditions.
- **Folk religionists.** People from Myanmar and elsewhere in Southeast Asia, who have migrated to the eastern region of the study area, paint symbols and designs that derive from their religion rather than from the local environment.

The distribution of artistic subjects in the Himalayas shows how folk customs are influenced by cultural institutions such as religion and by environmental processes such as climate, landforms, and vegetation. These groups display similar uniqueness in their dance, music, architecture, and crafts.

Pause & Reflect 4.1.2 What geographic factors account for the diversity of cultures in the Himalayas?



▲ **FIGURE 4-7 DISTRIBUTION OF FOLK CULTURE: ART** Distinct folk painting traditions are distributed within the Himalayas, a result of isolation of cultural groups.

Diffusion of Electronic Communications

Learning Outcome 4.1.3 Trace the origin and diffusion of social media.

Geographic concepts help us understand the distribution and diffusion of popular culture. Popular culture diffuses rapidly around the world in the twenty-first century primarily through electronic media. The latest fashions in material culture and leisure activities can be viewed by anyone in the world who has access to one or more forms of electronic media. Electronic media increase access to popular culture for people who embrace folk culture and at the same time increase access to folk culture for people who are part of the world's popular culture scene.

Diffusion of Cell Phones & Smartphones

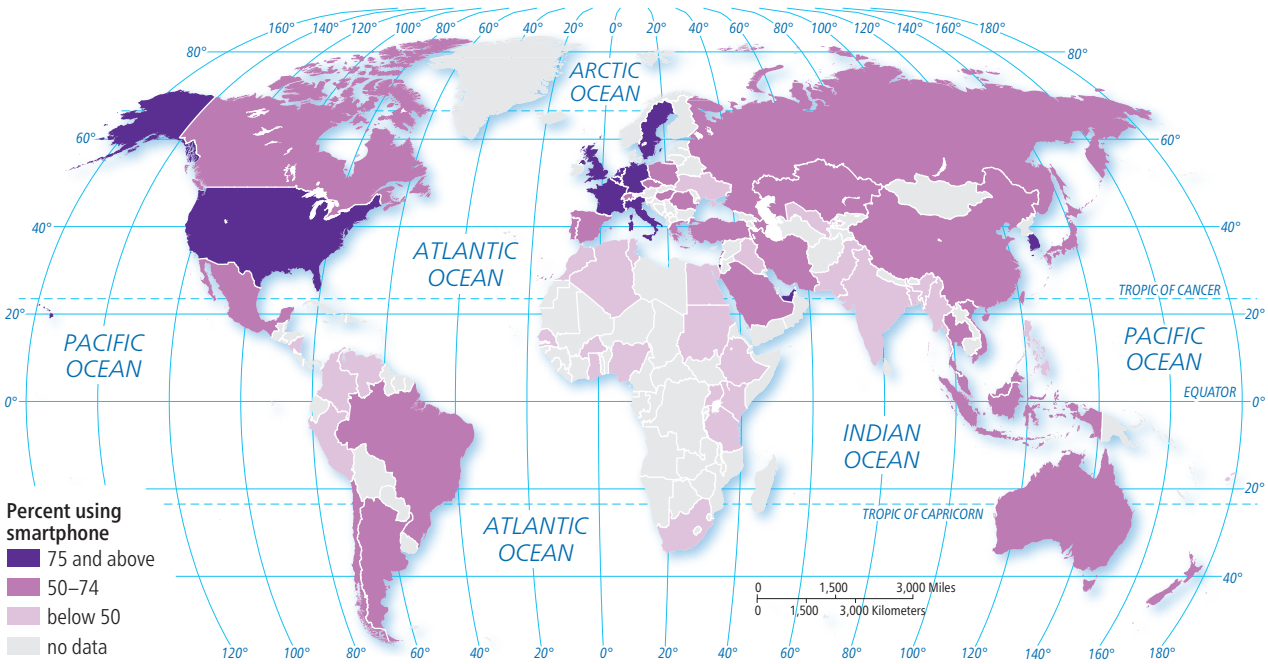
Cell phones have diffused rapidly around the world in the twenty-first century. In the world as a whole, the number of cell phones increased from 338 per 1,000 in 2005 to 1,349 per 1,000 in 2022.

Cell phones have become common in Africa, where traditional land line services are scarce. Access to electricity is limited in Africa, but cell phones do not require the costly investment of connecting wires to each individual building, and more individuals can obtain service from a single tower or satellite.

Smartphone ownership is also diffusing rapidly, even in Africa (Figure 4-8). The percentage of Americans owning smartphones increased from 35 percent in 2011 to 85 percent in 2022. More than 90 percent of Americans between 18 and 29 years old have smartphones, but ownership is also increasing rapidly among older Americans. Internationally, the rate of ownership of smartphones remains higher among developed countries than among developing ones, but the gap is narrowing (Figure 4-9).

Pause & Reflect 4.1.3 Compare the impact on a society of cell phones that enable voice communication and simple texting with the impact of smart phones that give users access to a wide range of media, including the internet.

▲ **FIGURE 4-8 DIFFUSION OF SMARTPHONES** Africa.

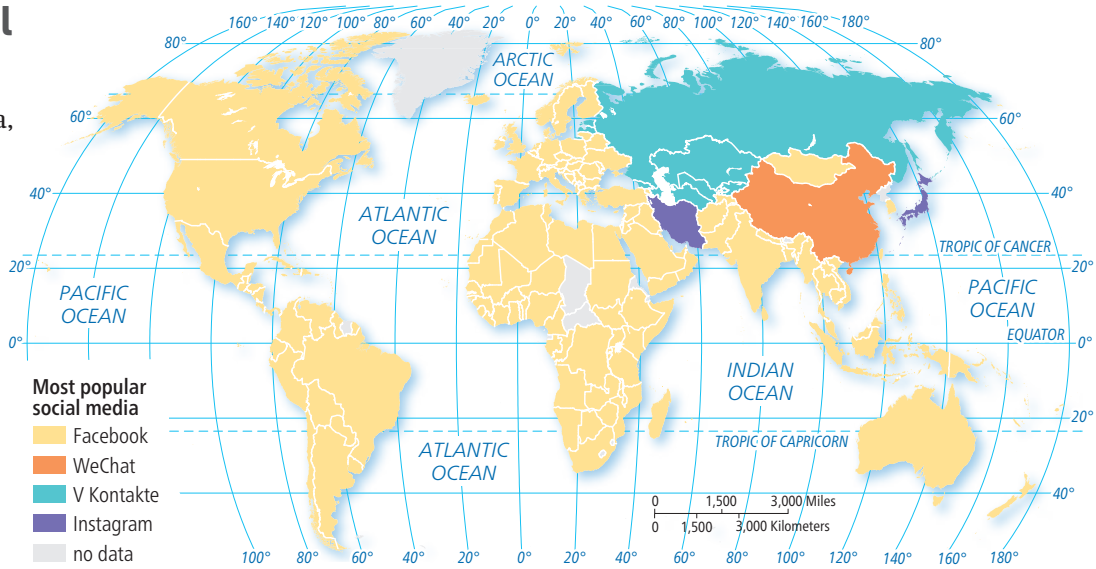


▲ **FIGURE 4-9 DISTRIBUTION OF SMARTPHONES**

Most Popular Social Network

In the first years of social media, many distinct networks were popular in much of the world, especially in developing countries. Most of those competing social networks were quickly supplanted or purchased by Facebook, especially in Latin America and Africa (Figure 4-10).

Notably absent from the list of leading Facebook users is the world's most populous state, China. China's government has limited the ability of the Chinese people to use Facebook, instead promoting WeChat, a social media platform the government censors. Russia also discourages the use of Facebook. Restricting the freedom to use the internet is a major issue in some countries, as discussed later in this chapter.

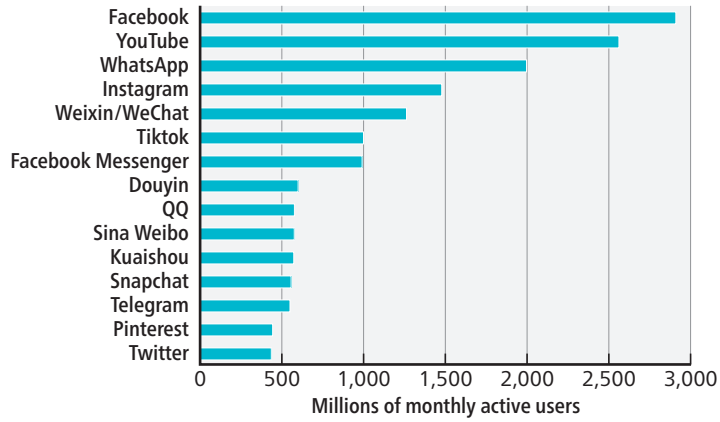


▲ **FIGURE 4-10 MOST POPULAR SOCIAL MEDIA BY COUNTRY**

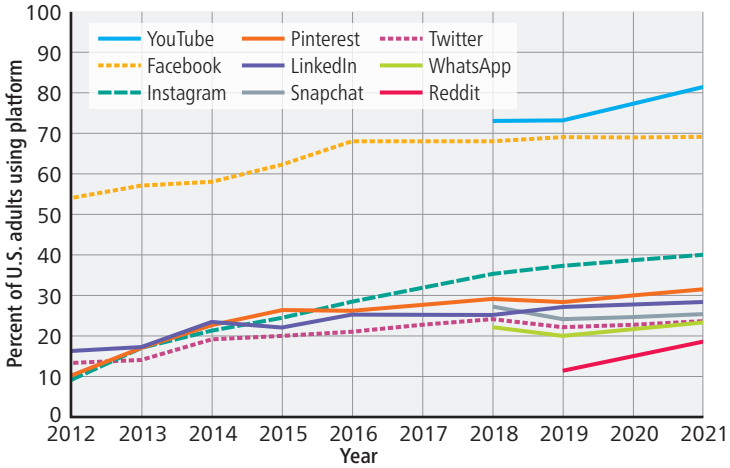
Teenagers in the United States have different social platform preferences compared with older Americans. Most popular among teenagers are YouTube, Instagram, Facebook, Snapchat, and Twitter (Figure 4-13). Facebook is the most popular platform for Americans over age 65.

Regional & Age Differences in Popularity of Social Media

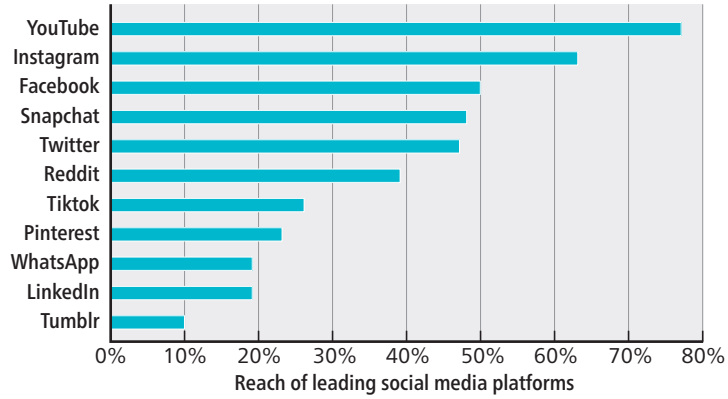
Regional differences persist in the use of social media. Worldwide, Facebook is the most popular platform, followed by YouTube, WhatsApp, Instagram, and WeChat (Figure 4-11). In the United States, YouTube is most popular, followed by Facebook, Instagram, Pinterest, and LinkedIn (Figure 4-12). Instagram and YouTube use has been increasing, whereas Facebook use has been flat.



▲ **FIGURE 4-11 MOST POPULAR SOCIAL MEDIA PLATFORM, WORLDWIDE**



▲ **FIGURE 4-12 MOST POPULAR SOCIAL MEDIA PLATFORM, UNITED STATES**



▲ **FIGURE 4-13 MOST POPULAR SOCIAL MEDIA PLATFORM, U.S. TEENAGERS**

KEY ISSUE

4.2 | Why Might Culture Diffuse?

Geographers observe that cultural features display distinctive regional distributions. Cultural regions are often vernacular, that is, perceived by people to exist as part of their cultural identity. In other cases, a cultural region may be formal or functional. For example, Canada's Québec Province is a formal cultural region with distinctive cultural features, such as the adoption of French as the province's only official language. A functional cultural region would be the area of support for the Montréal Canadiens hockey team. An example of a vernacular region related to Québécois culture would be poutine, a dish of French fries and cheese curds topped with brown gravy.

Origin & Diffusion of Folk & Popular Music

Learning Outcome 4.2.1 Compare differences in geographic dimensions of folk and popular music.

Every culture in human history has had some tradition of music, argues music researcher Daniel Levitan. As music is a part of both folk and popular culture traditions, it can be used to illustrate the differences in the origin, diffusion, and distribution of folk and popular culture.

Folk Music

According to a Chinese legend, music was invented in 2697 B.C.E., when the Emperor Huangdi sent Ling Lun to cut bamboo poles that would produce a sound matching the call of the phoenix bird. In reality, folk songs usually originate anonymously and are transmitted orally. The words of a song may be modified from one generation to the next reflecting changes in temperature, precipitation, and other features of the natural environment, but the content is most often derived from events in daily life that are familiar to the majority of the people. As people migrate, folk music travels with them as part of the diffusion of folk culture.

Folk songs may tell a story or convey information about life-cycle events, such as birth, death, and marriage, or environmental features, such as agriculture and climate. For example, in Vietnam, where many people are subsistence farmers, information about agricultural technology was traditionally conveyed through folk songs. The following folk song provides advice about the difference between seeds planted in summer and seeds planted in winter:

Ma chiêm ba tháng không già

Ma mùa tháng ruôi át là không non.[1]

This song can be translated as follows:

While seedlings for the summer crop are not old when they are three months of age,

Seedlings for the winter crop are certainly not young when they are one and a half months old.

English-language folk songs often draw upon similar themes, even if the specific information conveyed about the environment differs.

Festivals throughout Vietnam feature music in locally meaningful environmental settings, such as hillsides or on water. Singers in traditional clothes sing about elements of daily life in the local village, such as the trees, flowers, and water sources (Figure 4-14).

FIGURE 4-14 FOLK MUSIC: HOÀN KIÊ'M LAKE, VIETNAM Vietnamese singers perform Quan Họ folk songs as part of the Lim Festival, which is held annually on the 13th to the 15th day of the first lunar month. Quan Họ folk music dates back more than 500 years. It is included by UNESCO on its Lists of Intangible Cultural Heritage, which has the goals of protecting and increasing awareness of the world's most important cultural features.

[1]From John Blacking and Joann W. Kealiinohomoku, eds., *The Performing Arts: Music and Dance* (The Hague: Mouton, 1979), 144. Reprinted by permission of the publisher.

Popular Music

In contrast to folk music, popular music is written by specific individuals for the purpose of being sold to or performed in front of a large number of people. It frequently displays a high degree of technical skill through manipulation of sophisticated electronic equipment.

For example, popular music as we know it today originated around 1900. At that time, the main popular musical entertainment in North America and Europe was the variety show, called the music hall in the United Kingdom and vaudeville in the United States. To provide songs for music halls and vaudeville, a music industry was developed in a district of New York that became known as Tin Pan Alley. The diffusion of American popular music worldwide began in earnest during the 1940s, when the Armed Forces Radio Network broadcast music to American soldiers and to citizens of countries where American forces were stationed or fighting during World War II.

Popular music is increasingly delivered through streaming services (Figure 4-15). These services require customers to pay a fee for access to a music library. Worldwide, the leading music streaming service is Spotify, which has around one-third of the market. Spotify and Apple Music are leading services in the United States, whereas Tencent is the leader in China and Gaana and JioSaavn are the leaders in India.

Popular Music Clusters

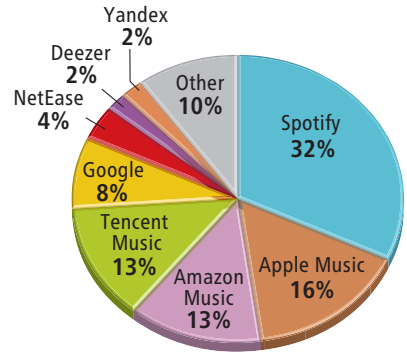
Popular musicians increasingly cluster in communities where other creative, musical artists reside, regardless of the particular style of music for which the place is known. Nashville has the highest location quotient of popular musicians, especially those performing country and gospel (Figure 4-16). The location quotient is the percentage of employees who work in the music industry in a city compared with the percentage of employees who work in the music industry throughout Canada and the United States. New York, Los Angeles, and San Francisco, which are much larger metropolitan areas than Nashville, have relatively high total numbers of musicians as well as high concentrations of musicians.

Musicians cluster in these places so they can be near sources of employment and cultural activities that appeal to a wide variety of artists, not just performers of a specific type of music. Popular musicians are also attracted to these places for better access to agencies that book live performances, an increasingly important component of the popular music industry.

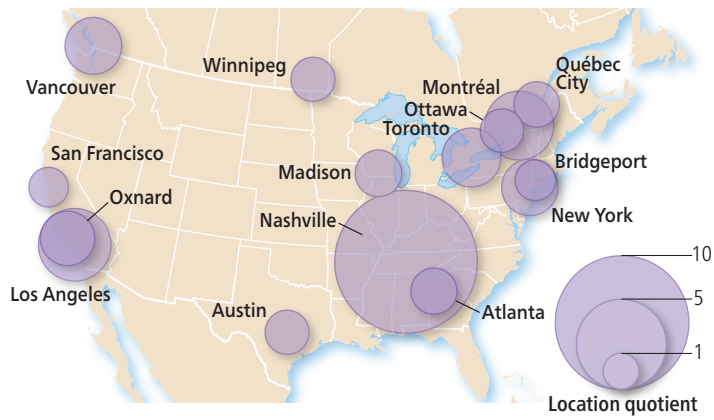
Regional Variations

Regional variations can be observed in popular music preferences. For example, within the United States hip hop (including rap and R&B) is relatively popular in large urban areas like New York and Los Angeles, whereas Latin music is in Miami and south Texas and country music is in many rural areas (Figure 4-17).

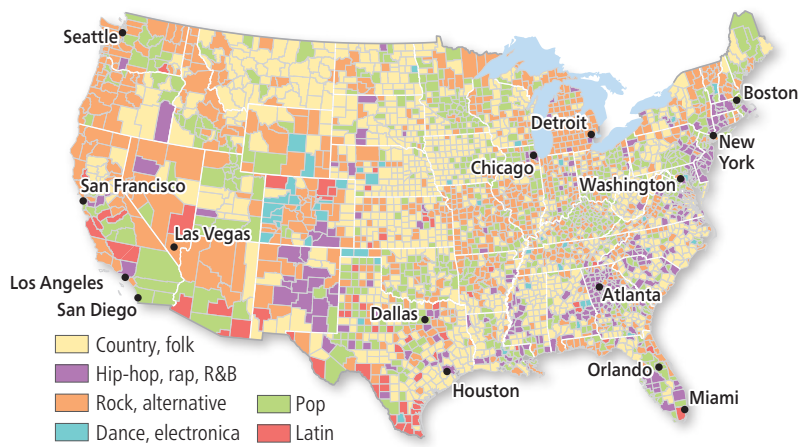
Pause & Reflect 4.2.1 What type of music do you like? Does the distribution in Figure 4-17 match your preference?



▲ **FIGURE 4-15 WORLDWIDE MUSIC STREAMING SERVICES**



▲ **FIGURE 4-16 POPULAR MUSIC CLUSTERS**



▲ **FIGURE 4-17 REGIONAL PREFERENCES IN MUSIC GENRES**

Origin & Diffusion of Folk & Popular Sports

Learning Outcome 4.2.2 Describe how sports have been transformed from folk to popular culture.

Many sports originated as isolated folk customs and were diffused like other folk culture, through the migration of individuals. The contemporary diffusion of organized sports, however, displays characteristics of popular culture.

Folk Culture: Origin of Soccer

Soccer, the world's most popular sport – known in most cultures as football – originated as a folk custom in England during the eleventh century. It was transformed into a part of global popular culture beginning in the nineteenth century.

As with other folk customs, soccer's origin is obscure. The earliest documented contest took place in England in the eleventh century. According to football historians, after the Danish invasion of England between 1018 and 1042, workers excavating a building site encountered a Danish soldier's head, which they began to kick. "Kick the Dane's head" was imitated by boys, one of whom got the idea of using an inflated cow bladder. Early football games resembled mob scenes. A large number of people from two villages would gather to kick the ball. The winning side was the one that kicked the ball into the center of the rival village.

Popular Culture: Diffusion of Soccer

The transformation of football from an English folk custom to global popular culture began in the 1800s. Football and other recreation clubs were founded in the United Kingdom, frequently by churches, to provide factory workers with organized recreation during leisure hours. Sport became a subject that was taught in school as physical fitness.

Increasing leisure time permitted people not only to participate in sporting events but also to view them. With higher incomes, spectators paid to see first-class events. To meet public demand, football clubs began to hire professional players. Several British football clubs formed the Football Association in 1863 to standardize the rules of the game and to organize professional leagues. The word *soccer* originated when the word *association* was shortened to *assoc*, which ultimately became twisted around into the word *soccer*. Organization of the sport into a formal structure in the United Kingdom marks the transition of football from folk to popular culture.

Beginning in the late 1800s, the British exported association football around the world, first to continental Europe and then to other countries. For example, Dutch students returning from studies in the United Kingdom were the first to play football in continental Europe in the late 1870s. In Bilbao, Spain, miners adopted the sport in 1893, after seeing it played by English engineers working there. British citizens further diffused the game throughout the worldwide British Empire.

In the twentieth century, soccer, like other sports, was further diffused by new communication systems, especially TV. Today, soccer is played by children and adults and by women and men in every region of the world (Figures 4-18 and 4-19).

▲ **FIGURE 4-18 POPULAR SPORTS: YOUTH SOCCER** Andover RAFC plays Basingstoke Colts in English youth league (wearing yellow and blue stripes).

▲ **FIGURE 4-19 POPULAR SPORTS: WOMEN'S SOCCER** Palmeiras (in green) plays Atletico MG in Brazil's Campeonato Brasileiro de Futebol Feminino.

Regionally Distinctive Sports

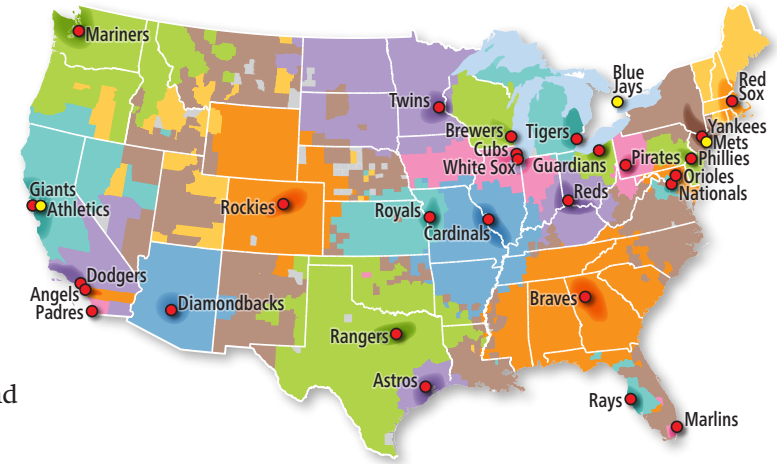
Most other sports have diffused less widely than soccer. Cultural groups still have their own preferred sports, which are often unintelligible to people elsewhere. Consider the following:

- Cricket is popular primarily in the United Kingdom and former British colonies, especially in Africa, South Asia, the South Pacific, and Caribbean islands.
- Ice hockey prevails, logically, in colder climates, especially in Canada, the northern United States, northern Europe, and Russia.
- Wushu, martial arts that combine forms such as kicking and jumping with combat such as striking and wrestling, is especially popular in China.
- Baseball, once confined to North America and the Caribbean, became popular in Japan in the late nineteenth century after it was introduced by Japanese students returning from studies in the United States as well as Americans working in Japan.
- Australia rules football is a sport distinct from soccer and the football played in North America. Distinctive forms of football developed in Australia as well as the United States and Canada as a result of lack of interaction among sporting nations during the nineteenth century.
- Lacrosse was traditionally played by the Iroquois, who called it *guhchigwaha*, which means "bump hips." European colonists in Canada picked up the game from the Iroquois and diffused it to a handful of U.S. communities, especially in upstate and Long Island, New York, as well as Maryland.

Sports can be a strong force for cultural and regional identity. For example, Major League Baseball teams have strong regional identities (Figure 4-20). Lacrosse has fostered cultural identity among the Iroquois Confederacy of Six Nations (Cayugas, Mohawks, Oneidas, Onondagas, Senecas, and Tuscaroras). The Haudenosaunee Nationals Men's Lacrosse Team (formerly known as the Iroquois Nationals team) participates in the Federation of International Lacrosse Men's World Championship, along with teams from more than a dozen countries, including Canada and the United States. The team has been unable to travel to some international tournaments because immigration officials do not always accept their Haudenosaunee Confederacy passports (Figure 4-21).

Despite the diversity in distribution of sports across Earth's surface and the anonymous origin of some games, organized spectator sports today are part of popular culture. The common element in professional sports is the willingness of people throughout the world to pay for the privilege of viewing events played by professional athletes, in person or through TV or streaming devices.

Electronic communications also foster the invention of new sports. An example is **esports**, which are competitions using video games. Esports first became popular in Asia. South Korea was the first country to license professional esports players. Once reserved for amateurs, esports are now played by professional teams, with spectators watching through live streaming. Online streaming media platforms, especially YouTube and Twitch, have become key to the growth of esports. For example, the Overwatch League, launched in 2018, includes 20 esports teams that attack or defend against opponents while competing for an objective (Figure 4-22). Eleven of the city-based teams are in the United States, four in China, two in Canada, and one each in France, South Korea, and the United Kingdom.



▲ **FIGURE 4-20 REGIONS OF MAJOR LEAGUE BASEBALL FANS**

▶ **FIGURE 4-21 HAUDENOSAUNEE NATIONALS LACROSSE** Gewas Schindler, a member of the Onondaga Nation, has played lacrosse and served as general manager for the Haudenosaunee. Schindler is holding his passport, which is issued by the Haudenosaunee Confederacy).

▼ **FIGURE 4-22 ESPORTS** Watching an Overwatch game, China.

Distribution of Folk & Popular Clothing

Learning Outcome 4.2.3 Compare reasons for distribution of clothing styles in folk and popular culture.

People living in folk cultures have traditionally worn clothing in part in response to distinctive agricultural practices and climatic conditions. In popular culture, clothing preferences generally express class, occupation, and other elements of cultural identity rather than that which is practical in particular environments.

Folk Clothing Preferences

People wear distinctive folk clothing for a variety of environmental and cultural reasons (Figure 4-23). The folk custom in the Netherlands of wearing wooden shoes may appear quaint, but it still has practical uses in a wet climate (Figure 4-24). In arctic climates, fur-lined boots protect against the cold, and snowshoes permit walking on soft, deep snow without sinking in it. People living in warm and humid climates may not need any footwear if heavy rainfall and time spent in water discourage such use. Cultural factors, such as religious beliefs, can also influence clothing preferences.

Increased travel and the diffusion of media have exposed North Americans and Europeans to other forms of dress, just as people in other parts of the world have come into contact with Western dress. The poncho from South America, the dashiki of the Yoruba people of Nigeria (Figure 4-25), and the Aleut parka have been adopted by people elsewhere in the world. The continued use of folk costumes in some parts of the globe may persist not because of distinctive environmental conditions or traditional cultural values but to preserve cultural identity or to attract tourists.

Wearing traditional clothing in countries dominated by popular culture can be controversial, and conversely so can wearing popular clothing in countries dominated by folk-style clothing. For example, men in these places must decide whether to wear Western-style suits, especially if they occupy positions of leadership in business or government.

Pause & Reflect 4.2.3 Can you think of restrictions on clothing styles in your country, perhaps in schools, for example?

▲ **FIGURE 4-23 TRADITIONAL CLOTHING** Spiti Valley, India.

▲ **FIGURE 4-24 DUTCH SHOES** Artisan makes wooden shoes using traditional methods, Zaandam, The Netherlands.

▲ **FIGURE 4-25 TRADITIONAL CLOTHING: DASHIKI**

Rapid Diffusion of Popular Clothing Styles

Changes in contemporary fashion and popular clothing take place in an interconnected world. Fashionable clothes, which constantly feature new styles, are among the most globally distributed products available to consumers today. Individual clothing habits reveal that popular culture can be distributed across the landscape with little regard for its distinctive physical features.

Instead, popular clothing habits are more likely to reflect occupation and income. A lawyer or business executive, for example, tends to wear a dark suit, light shirt or blouse, and necktie or scarf, whereas a factory worker wears jeans and a work shirt. A lawyer in New York is more likely to dress like a lawyer in Argentina (Figure 4-26) than like a factory worker in New York.

Women's clothes, in particular, change in fashion from one year to the next (Figure 4-27). The color, shape, and design of dresses, for example, change to imitate pieces created by clothing designers. For social purposes, people with sufficient income may update their wardrobe frequently with the latest fashions. The clothing itself may have been made in another region of the world (see Chapter 11).

In the past, years could elapse from the time an original dress was displayed to the time that inexpensive reproductions were available in the stores. Now the time lag is only a few weeks because of the diffusion of electronic communications.

However, consumers in two places who choose the same brand of jeans will wear them in different cultural contexts. Clothing considered commonplace and traditional in one part of the world may be viewed as bold and controversial in another (Figure 4-28).

▲ **FIGURE 4-26 POPULAR CLOTHING: WEARING SUITS** Argentine lawyers.

▲ **FIGURE 4-27 POPULAR CLOTHING: WOMEN'S FASHION CLOTHING** London.

▲ **FIGURE 4-28 POPULAR CLOTHING: WEARING JEANS** Roadside stall sells jeans, New Delhi, India.

Folk & Popular Housing

Learning Outcome 4.2.4 Analyze factors that influence patterns of folk housing.

All humans need a place to live. French geographer Jean Brunhes, a major contributor to the cultural landscape tradition, viewed the house as being among the essential facts of human geography. It is a product of both cultural tradition and natural conditions. American cultural geographer Fred Kniffen considered the house to be a good reflection of cultural heritage, current fashion, functional needs, and environmental conditions.

Folk Housing: Environmental Influences

Distinctive environmental and cultural features influence the provision of housing in folk cultures. The type of building materials used to construct folk houses is influenced partly by the resources available in the environment. Stone, grass, sod, and skins may be used, but the two most common building materials in the world are wood and brick.

The style of construction can also be influenced by the environment. For example, the construction of a pitched roof is important in wet or snowy climates to facilitate runoff and to reduce the weight of accumulated snow. Windows may face south in temperate climates to take advantage of the Sun's heat and light. In hot climates, on the other hand, roofs may be flat, and window openings may be smaller to protect the interior from the full heat of the Sun (Figure 4-29).

Folk Housing: Cultural Influences

The distinctive form of folk houses may derive primarily from religious values and other customary beliefs. The direction in which some structures of houses are built may be more important than the direction in which other structures in them are built.

Houses may have sacred walls or corners. In the south-central part of the island of Java, for example, the front door always faces south, the direction of the South Sea Goddess, who holds the key to Earth. The eastern wall of a house is considered sacred in Fiji, as is the northwestern wall in parts of China. Sacred walls or corners are also noted in parts of the Middle East, India, and Africa.

In Madagascar, the main door is on the west, considered the most important direction, and the northeastern corner is the most sacred. The northern wall in Madagascar houses is for honoring ancestors; in addition, important guests of those residences enter a room from the north and are seated against the northern wall. The bed is placed against the eastern wall of the house, with the head facing north.

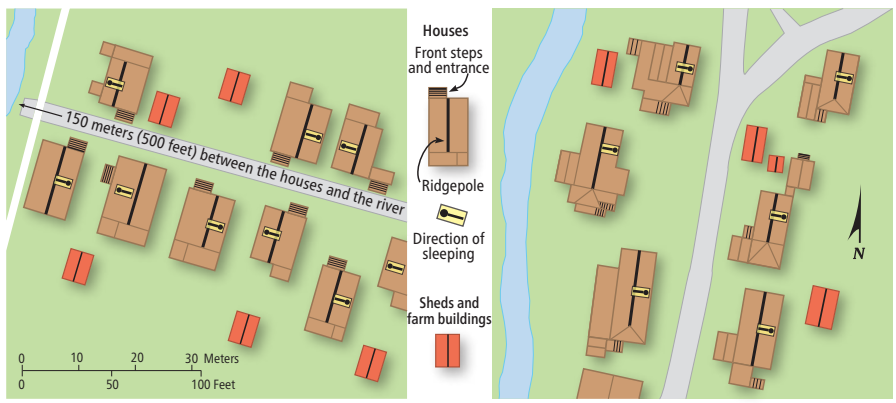
The Lao people in northern Laos arrange beds perpendicular to the center ridgepole of the house (Figure 4-30a). Because the head is considered high and noble and the feet low and vulgar, Lao people sleep so that their heads will be opposite their neighbor's heads and their feet opposite their neighbor's feet. There is one principal exception to this arrangement: A child who builds a house next door to his or her parents sleeps with his or her head toward the parents' feet as a sign of obeying the customary hierarchy.

The Lao do not orient their houses in the same manner as the Yuan and Shan peoples in nearby northern Thailand (Figure 4-30b). The Yuan and Shan ignore the position of neighbors, and all sleep with their heads toward the east. Staircases in Yuan and Shan houses must not face west; it is the least auspicious direction and is associated with death and evil spirits.

Pause & Reflect 4.2.4 What factors were considered in the arrangement of the bed in your bedroom?

(a) Oman (b) Estonia

▲ **FIGURE 4-29 FOLK HOUSING: ENVIRONMENTAL INFLUENCES** (a) in the desert in Oman and (b) in the winter in Haanja, Estonia.



(a) Muang Nan, Laos (b) Ban Hua Nam Mae Sakud, Thailand

▲ **FIGURE 4-30 FOLK HOUSING: CULTURAL INFLUENCES** (a) Houses of Lao people in northern Laos, such as those in the village of Muang Nan, face one another across a path. Their ridgepoles (the centerline of the roof) are set perpendicular to the path but parallel to a stream. People sleep in the orientation shown, so neighbors are head-to-head or feet-to-feet. (b) Houses of Yuan and Shan peoples in the village of Ban Hua Nam Mae Sakud, Thailand, are not set in a straight line because of a belief that evil spirits move in straight lines. Ridgepoles parallel the path, and the heads of all sleeping people point eastward.

U.S. Folk Houses

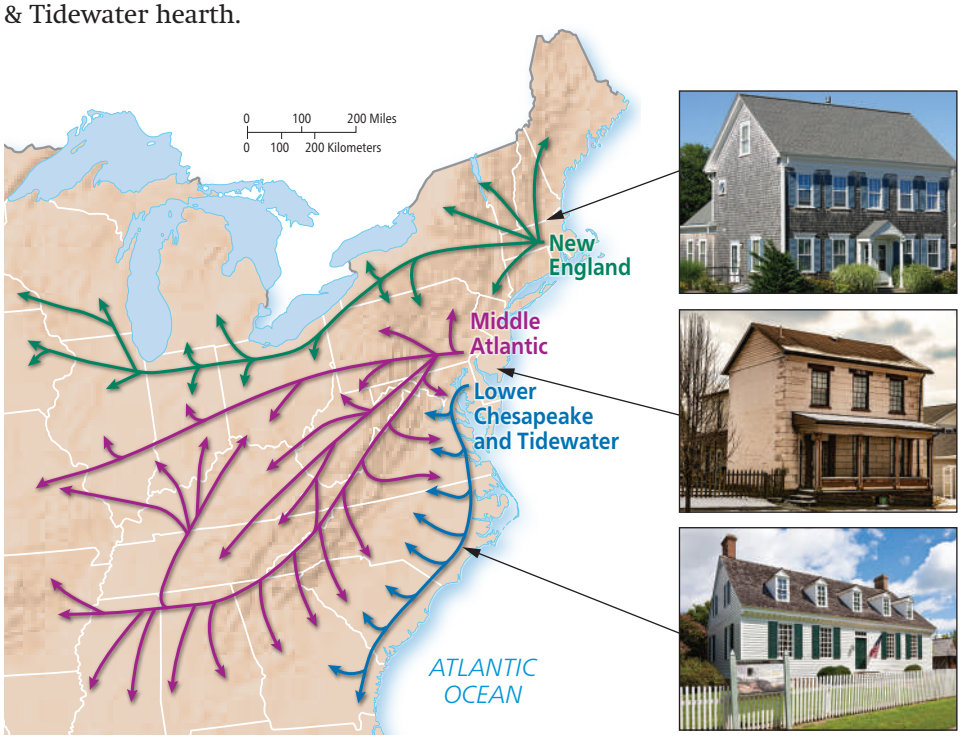
Older houses in the United States display local folk culture traditions. In contrast, housing built in the United States since the 1940s demonstrates how popular customs vary more in time than in place.

Geographer Fred Kniffen identified three major hearths, or nodes, of folk house forms in the United States (Figure 4-31). When families migrated westward in the 1700s and 1800s, they cut trees to clear fields for planting and used the wood to build houses, barns, and fences. The style of pioneer homes reflected whatever style was prevailing at the place on the East Coast from which they migrated.

Regional differences in house styles persist. For example, one story ranch houses are more common in the South than in the North, perhaps a legacy of the Lower Chesapeake & Tidewater hearth.

Popular Housing

Houses built in the United States since the mid-twentieth century display popular culture influences. The degree of regional distinctiveness in housing style has diminished because rapid communication and transportation systems provide people throughout the country with knowledge of alternative styles (Figure 4-32). Furthermore, most people do not build the houses in which they live. Instead, houses are usually mass-produced by construction companies. Houses show the influence of shapes, materials, detailing, and other features of architectural style in vogue at any one point in time. In the years immediately after World War II, which ended in 1945, most U.S. houses were built in a modern style. Since the 1960s, styles that architects call neo-eclectic have predominated.



New England. The distinctive New England house style was box shaped with a central hall. The house style can be found throughout the Great Lakes area as far west as Wisconsin because that region was settled primarily by migrants from New England.

Middle Atlantic. The principal house style in the Middle Atlantic region was known as the "I house" and typically featured two full stories in height, was one room deep, and at least two rooms wide. Middle Atlantic migrants carried their house type westward across the Ohio Valley and southwestward along the Appalachian trails.

Lower Chesapeake & Tidewater. The house style that originated in the Lower Chesapeake Bay & Tidewater Virginia area typically comprised one full story, with a steep roof and chimneys at either end. Migrants spread this style along the Southeast Coast.

▲ **FIGURE 4-31 FOLK HOUSING: U.S. HEARTHS** U.S. house types in the United States originated in three main source areas and diffused westward along different paths. These paths coincided with predominant routes taken by migrants from the East Coast toward the interior of the country.

(a) Chicago suburb

(b) New York suburb

▲ **FIGURE 4-32 POPULAR HOUSING: U.S. SUBURBS** Similar Tudor style house in (a) Chicago suburb and (b) New York suburb. Houses in the English Tudor style were especially popular in affluent suburbs during the 1970s.

Food Customs

Learning Outcome 4.2.5 Identify reasons for folk and popular food preferences.

According to the nineteenth-century cultural geographer Vidal de la Blache, "Among the connections that tie [people] to a certain environment, one of the most tenacious is food supply; clothing and weapons are more subject to modification than the dietary regime, which experience has shown to be best suited to human needs in a given climate."

People do not simply eat what is available in their particular environment. Food preferences are strongly influenced by cultural traditions. What is eaten establishes one's social, religious, and ethnic memberships. The surest way to identify a family's ethnic origins is to look in its kitchen.

Folk Food Customs

Folk food customs are embedded especially strongly in the environment. Humans eat mostly plants and animals – living things that spring from the soil and water of a region. Inhabitants of a region must consider the soil, climate, terrain, vegetation, and other characteristics of the environment in deciding whether to produce particular foods.

The contribution of a location's distinctive physical features to the way food tastes is known by the French term **terroir**. The word comes from the same root as "terre" (the French word for "land" or "earth"), but terroir does not translate precisely into English; it has a similar meaning to the English expressions "grounded" and "sense of place." Terroir is the sum of the effects on a particular food item of soil, climate, and other features of the local environment.

For example, a special type of lentil is grown only around the village of Le Puy-en-Velay, France (Figure 4-33). The lentil has a distinctive flavor because of the area's volcanic soil and dry growing season. The distinctive taste of a glass of wine may derive from the terroir where the grapes are grown.

People adapt their food preferences to conditions in the environment. For example, in Asia, rice is grown in milder, moister regions, whereas wheat thrives in colder, drier regions (see Chapter 10). In Italy, traditional preferences for quick-frying foods resulted in part from a history of fuel shortages. In Northern Europe, before the availability of electricity and fossil fuels, an abundant wood supply encouraged the slow stewing and roasting of foods over fires, which also provided home heat in the colder climate. Certain foods may be eaten in folk cultures because their natural properties are perceived to enhance qualities considered desirable by the society.

▲ **FIGURE 4-33 FOLK FOOD CUSTOMS: TERROIR** A sculpture dedicated to the lentil in Le-Puy-en-Velay, France.

Food Taboos

According to many folk customs, everything in nature carries a signature, or distinctive characteristic based on its appearance and natural properties. Consequently, people may desire or avoid certain foods in response to perceived beneficial or harmful natural traits.

People refuse to eat particular plants or animals for a variety of reasons. Such a restriction on behavior imposed by religious law or social custom is a **taboo**. Other customs or practices, such as sexual behavior, carry prohibitions, but taboos are especially strong in the area of food. Some folk cultures may establish food taboos because of concern for the natural environment. These taboos may help to protect endangered animals or to conserve scarce natural resources. To preserve scarce animal species, only a few high-ranking people in some tropical regions are permitted to hunt, and the majority cultivate crops.

Relatively well-known taboos against consumption of certain foods can be found in the Jewish Bible. The ancient Hebrews were prohibited from eating a wide variety of foods, including animals that do not chew their cud or that have cloven feet and fish lacking fins or scales. These biblical taboos were developed through oral tradition and by rabbis into the kosher laws observed today by some Jews.

Muslims embrace a taboo against pork because pigs are unsuited for the dry lands of the Arabian Peninsula. Pigs would compete with humans for food and water without offering compensating benefits, such as being able to pull a plow, carry loads, or provide milk and wool. Widespread raising of pigs would be an ecological disaster in Islam's hearth.

Hindu taboos against consuming cattle can also be partly explained by environmental conditions. Cows are the source of oxen (castrated male bovine), the traditional choice for pulling plows as well as carts. A large supply of oxen must be maintained in India because every field has to be plowed at approximately the same time – when the monsoon winds bring rain. Religious sanctions have kept India's cattle herds large as a form of insurance against the loss of oxen with an increasing human population.

But the taboo against consumption of meat among many people, including Muslims, Hindus, and Jews, cannot be explained primarily by environmental factors. Social values must influence the choice of diet because people in similar climates and with similar levels of income consume different foods. The biblical food taboos helped the Jewish people maintain their identity and communal affiliation. That Christians ignore the biblical food injunctions is consistent with Christianity as a religion that seeks to attract many adherents from many places (see Chapter 6).

Popular Food Culture

In the popular culture of the twenty-first century, food preferences seem far removed from folk traditions. Popular food preferences today are influenced more by cultural values than by environmental features. Still, some regional variations can be observed between and within countries. For example, what to call sweetened, carbonated beverages—soda, pop, soft drink, or coke—varies within the United States. And environmental influences remain important in selected items, such as wine.

Why do Coca-Cola and Pepsi have different sales patterns? The two beverages are similar, and many people are unable to taste the difference. Yet consumers prefer Coke in some countries and Pepsi in others.

Coca-Cola accounts for more than half of the world's cola shares and Pepsi for another one-fourth. Coca-Cola is the sales leader in most of the Western Hemisphere. The principal exception is Canada's French-speaking province of Québec, where Pepsi is preferred (Figure 4-34). Pepsi won over the Québécois with advertising that tied Pepsi to elements of uniquely French Canadian culture. The major indoor arena in Québec City is named the Colisée Pepsi (Pepsi Coliseum).

▲ **FIGURE 4-34 FAST FOOD AND PEPSI IN RURAL QUÉBEC**

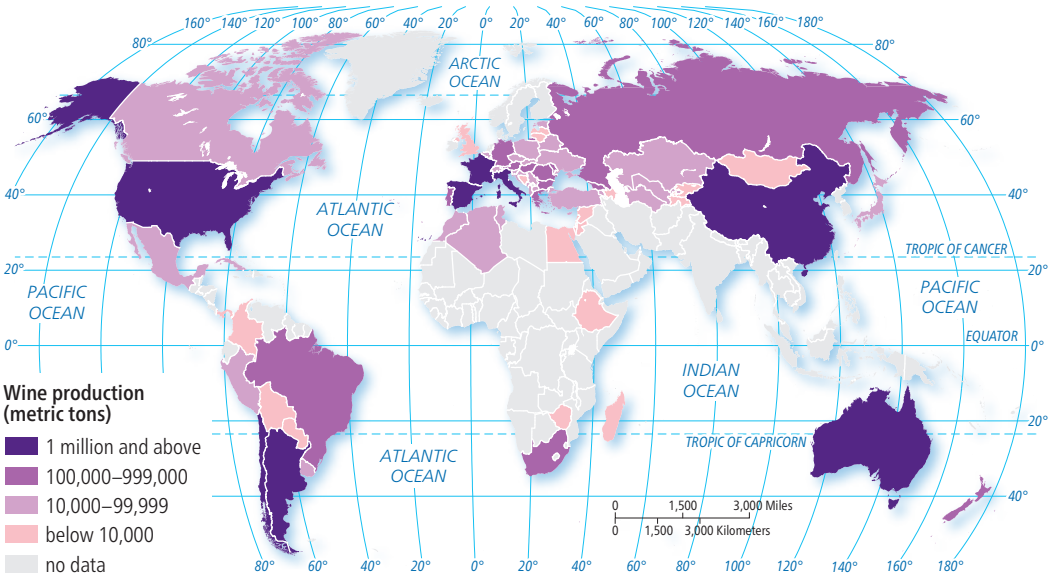
▲ **FIGURE 4-35 TERROIR: WINE PRODUCTION** Distinctive wine is produced from the vineyards in Saint-Émilion, Bordeaux, France.

Cola preferences are influenced by politics in Russia. Under communism, government officials made a deal with Pepsi to allow that cola to be sold in the Soviet Union. With the breakup of the Soviet Union and the end of communism, Coke entered the Russian market. Russians quickly switched their preference to Coke because Pepsi was associated with the discredited communist government. After the Russian invasion of Ukraine in 2022, both Pepsi and Coca-Cola suspended production and sales in Russia.

For many years, Arab countries in Southwest Asia & North Africa boycotted products that were sold in Israel because they opposed the existence of a Jewish state. Because Pepsi was not sold in Israel until 1992, Coke was the only option in Israel, whereas in most of Israel's neighbors Pepsi was preferred.

Wine Geography

The spatial distribution of wine production shows the influence of both environmental and cultural elements. The distinctive character of wine is derived from a vineyard's *terroir*—the unique combination of soil, climate, and other physical characteristics at the place where the grapes are grown (Figure 4-35). As well, wine is made today primarily in locations where there is a tradition of excellence in making it and where people live who like to drink it and can afford to purchase it (Figure 4-36).



◀ **FIGURE 4-36 WINE PRODUCTION** The distribution of wine production is influenced in part by the physical environment and in part by social customs. Most grapes used for wine are grown near the Mediterranean Sea or in areas of similar climate. Income, preferences, and other social customs also influence the distribution of wine consumption, as seen in the lower production levels of predominantly Islamic countries south of the Mediterranean.

KEY ISSUE

4.3 | Why Is Access to Culture Unequal?

Geographic concepts help to explain the distribution and diffusion of popular culture. Popular culture diffuses rapidly around the world in the twenty-first century primarily through electronic media. Electronic media increase access to popular culture for people who embrace folk culture and at the same time increase awareness of folk culture for people who are able to participate in global-scale popular culture.

Electronic Diffusion of Culture

Learning Outcome 4.3.1 Compare the diffusion of TV and the internet.

The distribution of popular culture around the world is not uniform. The principal obstacle to popular culture is lack of access to electronic media. Access is limited primarily by lack of income. In some developing countries, access is also limited by government controls or by the lack of electricity.

Diffusion of TV: Mid-Twentieth Century

The world's most important electronic media format by far is television. TV supplanted other formats, notably radio and telegraph, during the twentieth century. Into the twenty-first century, other formats have become popular, but they have not yet supplanted TV worldwide. Watching TV is especially important for popular culture for two reasons:

- Watching TV is the most popular leisure activity in the world. The average human watched 2.8 hours of TV per day in 2021, and the average American watched 3.1 hours.
- TV has been the most important mechanism by which popular culture rapidly diffuses across Earth.

Through the second half of the twentieth century, TV diffused from the United States to Europe and other developed countries and then to developing countries:

- **Early twentieth century: Multiple hearths.** TV technology was developed simultaneously in the United Kingdom, France, Germany, Japan, and the Soviet Union as well as in the United States.
- **Mid-twentieth century: United States dominates.** In 1954, the first year that the United Nations published data on the subject, the United States had 86 percent of the world's 37 million TV sets.
- **Late twentieth century: Diffusion to Europe.** TV diffused to Europe by 1970, but most of Africa and Asia countries had little if any TV broadcasting.
- **Early twenty-first century: Near-universal access.** TV ownership rates climbed sharply in developing countries.

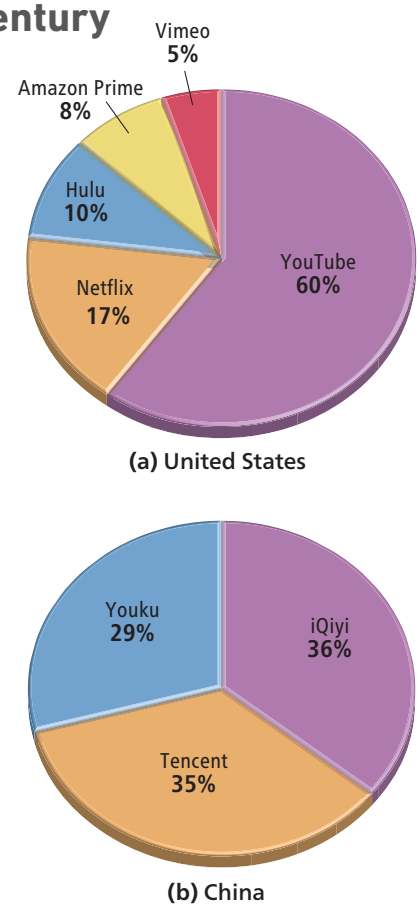
Diffusion of the Internet: Late Twentieth Century

The changing distribution and diffusion of internet service follows the pattern established by television a generation earlier, but at a more rapid pace:

- In 1995, most countries did not have internet service, and the United States had 63 percent of the world's users.
- Between 1995 and 2000, internet users increased rapidly in the United States, from 9 percent of the population (25 million people) to 44 percent (124 million people). But the worldwide increase was much greater, so the share of the world's internet users clustered in the United States declined from 63 percent to 35 percent.
- Between 2000 and 2022, internet usage continued to increase rapidly in the United States, to more than 90 percent of the population. Again, the U.S. increase was more modest than in the rest of the world, and the share of the world's internet users found in the United States continued to decline, to 6 percent in 2022. China now accounts for 22 percent of the world's internet users.

Diffusion of Streaming: Twenty-First Century

Video programming is increasingly delivered through internet streaming services. The average American watches 2.4 hours of streaming services per day. Regional differences can be seen in the choice of such services. The leading internet streaming services in the United States – YouTube, Netflix, Hulu, Amazon Prime, and Vimeo – are totally different than those in China – iQiyi, Tencent, and Youku (Figure 4-37). As with other social media platforms, the government of China prefers that its citizens utilize domestic streaming services rather than those originating in the United States and other Western countries.



▲ **FIGURE 4-37 STREAMING SERVICES** (a) in the United States; (b) in China.

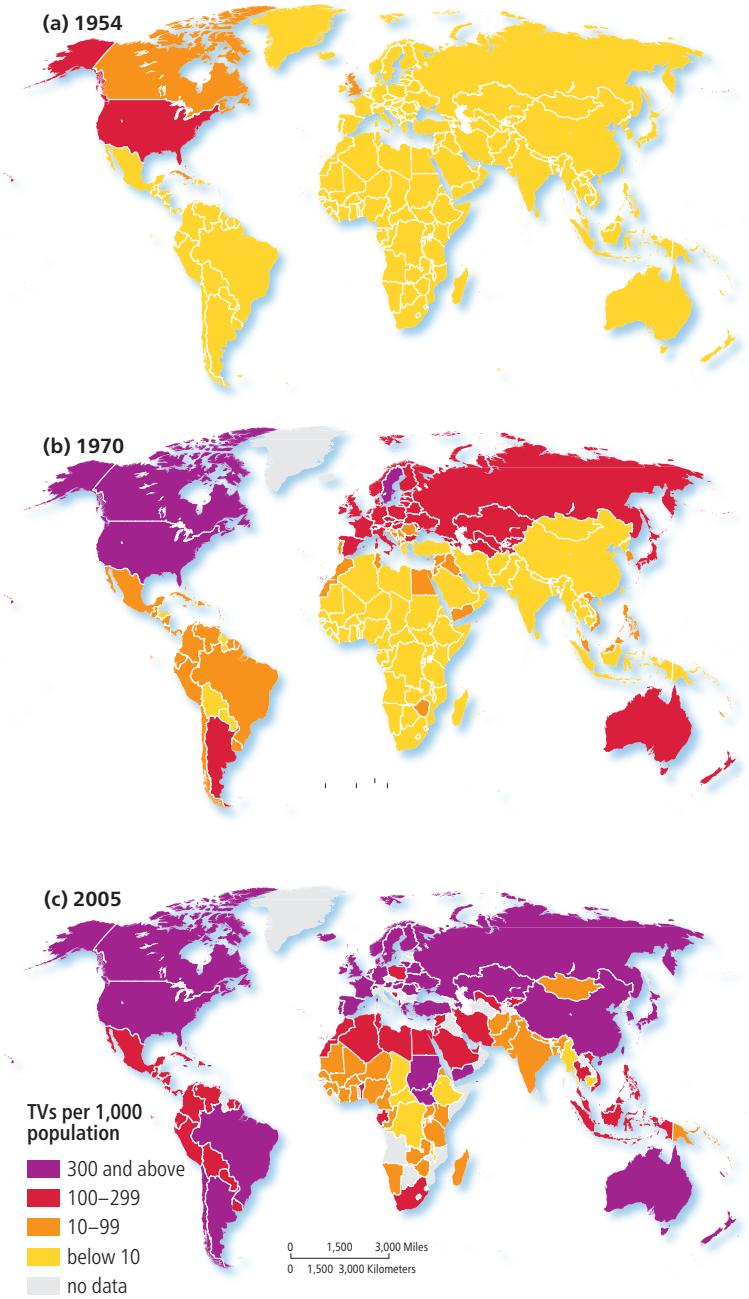
Comparing Diffusion of TV and the Internet

Figure 4-38 and Figure 4-39 show changes in the distribution and diffusion of TVs and the internet in the United States compared with the rest of the world.

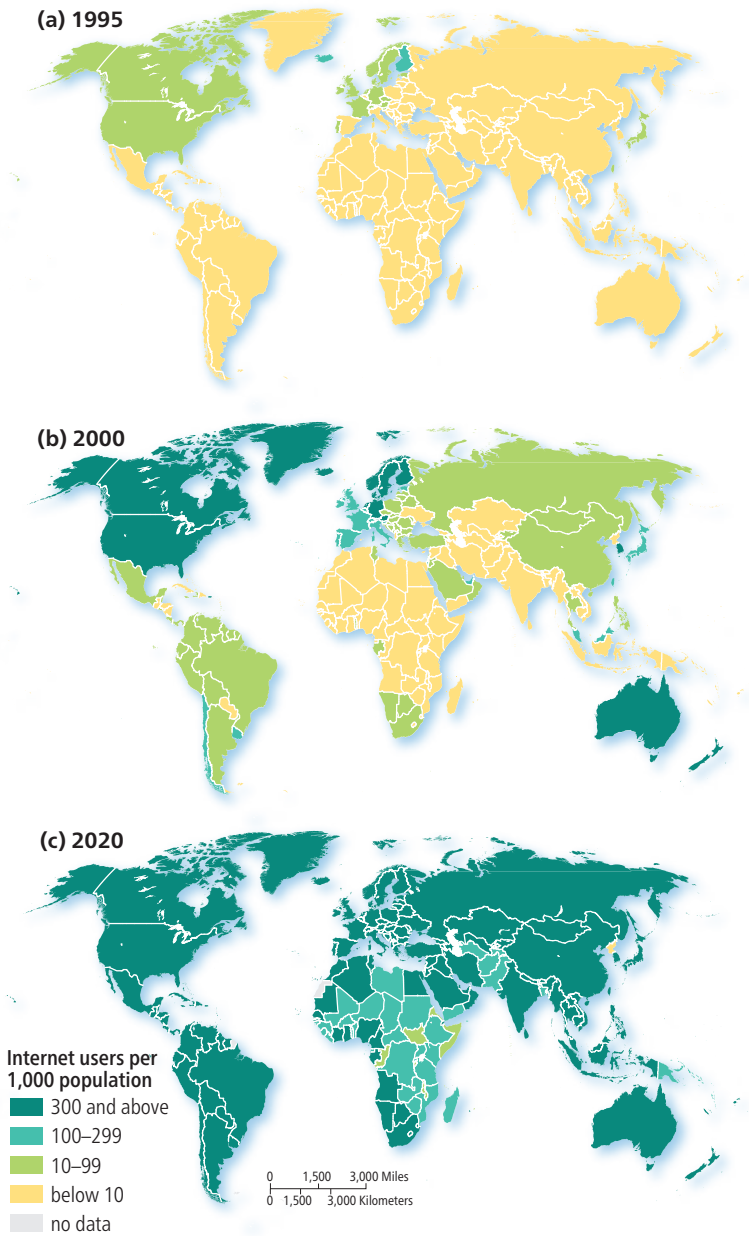
Note that all six maps in Figures 4-38 and 4-39 use the same intervals. For example, the highest class in all maps is 300 or more per 1,000. What is different between the two figures is the time interval period. The diffusion of TV from the United States to the rest of the world took a half-century, whereas the diffusion of the internet took only a decade.

Given the history of the internet diffusing around the world in the twenty-first century much more rapidly than did TV in the twentieth century, other electronic services may also diffuse rapidly in the years ahead. For example, the average American uses a smartphone, computer, or tablet for around 7 hours per day for internet-connected activities, such as doing social media, streaming music, and listening to podcasts. This is the same number of hours as the worldwide average and less than in some developing countries, including Brazil, India, Mexico, and South Africa.

Pause & Reflect 4.3.1 The United States has slightly under one TV per person. Does your household have more than one TV or less than one TV per person?



▲ **FIGURE 4-38 DIFFUSION OF TV** TVs per 1,000 population in (a) 1954, (b) 1970, and (c) 2005.



▲ **FIGURE 4-39 DIFFUSION OF INTERNET USERS** Internet users per 1,000 population in (a) 1995, (b) 2000, and (c) 2022.

Social Media & Interconnectivity

Learning Outcome 4.3.2 Compare the distribution of social media platforms.

The origin of social media in the twenty-first century has followed the pattern of electronic media in the late twentieth century. People based in the United States dominated the use of social media such as Facebook and Twitter during the early years.

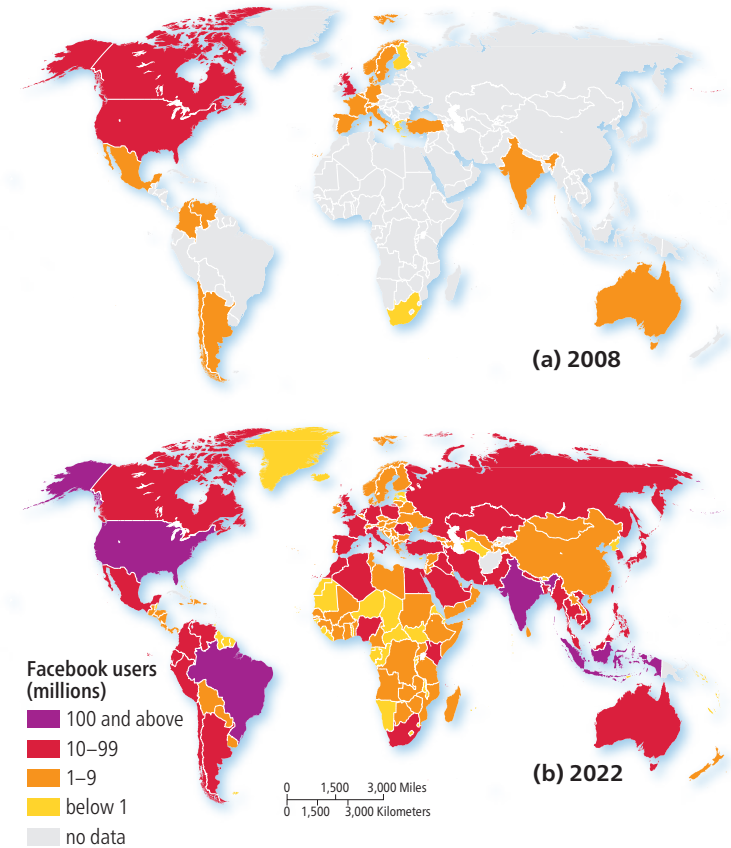
Social media originating in the United States will undoubtedly continue to diffuse to the rest of the world, although the rate and extent of future diffusion remain unknown. Will U.S. dominance reduce rapidly, or will people elsewhere in the world embrace other forms of social media instead? Evidence is mixed.

Diffusion of Facebook

Facebook, founded in 2004 by Harvard University students, has diffused rapidly to become by far the world's most popular social media platform. The United States started out with far more Facebook users than any other country. In 2009, five years after Facebook's founding, 34 percent of all users worldwide were clustered in the United States, which had 55 million users, well ahead of second place United Kingdom with 18 million (Figure 4-40).

The number of Facebook users continued to increase in the United States, to 239 million in 2022. But as Facebook has diffused to other countries, the share of users in the United States has declined, to 20 percent of the worldwide total in 2011 and 6 percent in 2022. In 2014, India became the second country to have more than 100 million Facebook users. Behind India were other developing countries, including Brazil, Indonesia, and Mexico.

FIGURE 4-40 DIFFUSION OF FACEBOOK



Diffusion of Other Social Media

Facebook, Twitter, Instagram, and YouTube are all following similar distribution patterns. Between 2009 and 2022, the number of users of all four platforms increased in the United States (Figure 4-41), and the number of users per 1,000 population also increased (Figure 4-42). On the hand, the United States accounted for a declining share of worldwide users of the platforms (Figure 4-43).

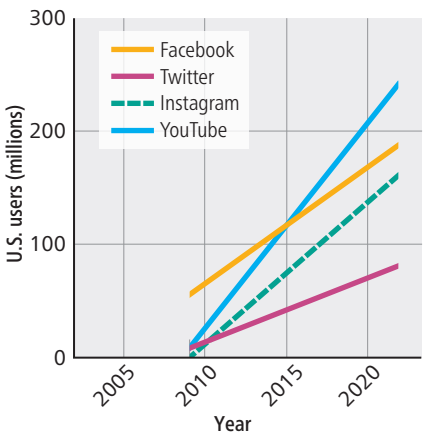


FIGURE 4-41 NUMBER OF U.S. USERS OF FOUR SOCIAL MEDIA PLATFORMS

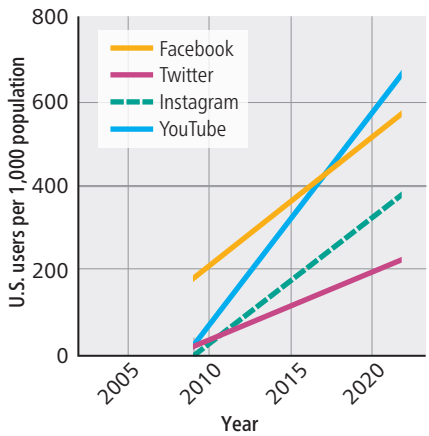


FIGURE 4-42 NUMBER OF U.S. USERS PER 1,000 POPULATION OF FOUR SOCIAL MEDIA PLATFORMS

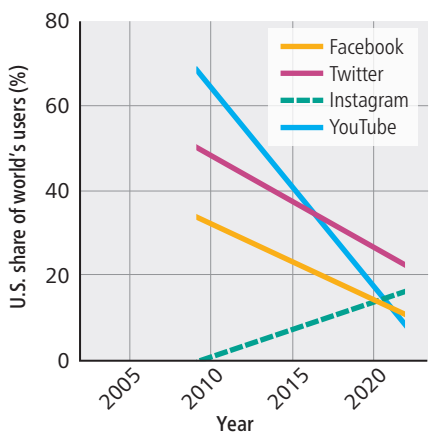
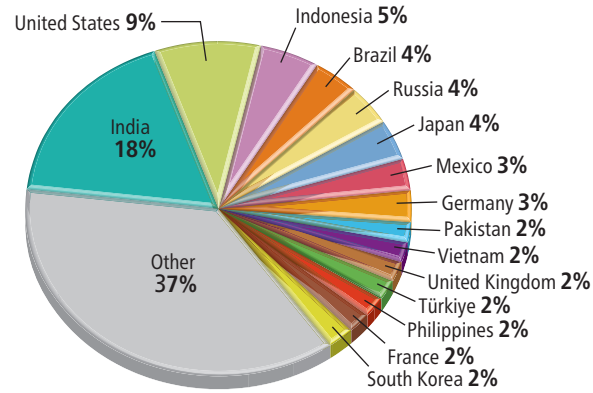


FIGURE 4-43 DIFFUSION OF FOUR SOCIAL MEDIA PLATFORMS FROM THE UNITED STATES TO OTHER COUNTRIES

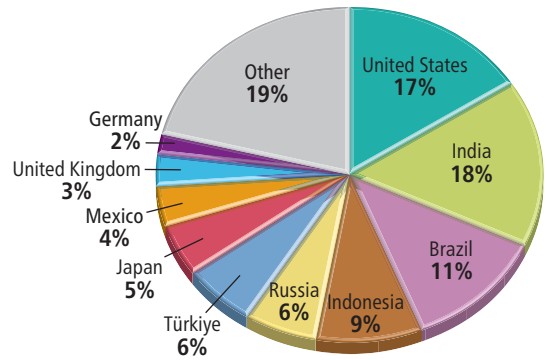
Distribution of Social Media

The world's four most widely used social media platforms – YouTube, Facebook, Instagram, and WhatsApp – all originated in the United States and diffused to other countries. As a result of rapid diffusion, the current distribution of the various social media platforms among the countries of the world no longer shows the United States in the lead.

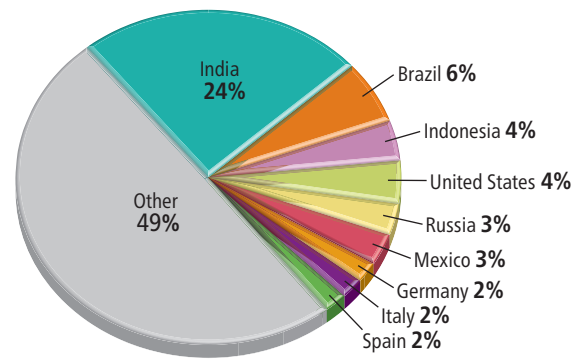
- **YouTube.** The country with the most YouTube users is India. Around one-half billion Indians used YouTube in 2022, twice as many as the second-leading country, the United States (Figure 4-44). Other countries in Asia dominate the list of most numerous YouTube users. Americans have a wider selection of YouTube programs to watch than do people in other countries.
- **Instagram.** As with YouTube, India is the country with the most Instagram users, and the United States is second (Figure 4-45). Brazil is also a leading country for Instagram users, coming in third. Russia ranked fifth in the world in the number of Instagram users, but after Russia's invasion of Ukraine, Instagram blocked accounts held by Russians. Ukrainians continue to be able to share information about the invasion through Instagram.
- **WhatsApp.** WhatsApp was launched as an app for iPhones in 2009 and for Android phones a year later. Facebook acquired WhatsApp in 2014. India accounts for one-fourth of the world's total users of WhatsApp (Figure 4-46). The United States is only fourth, behind India, Brazil, and Indonesia. Russians ranked fifth prior to the invasion of Ukraine, but as with Instagram, Russian WhatsApp accounts were blocked after Russia's attack on Ukraine.
- **Messaging apps.** WhatsApp is the most popular messaging app in 91 countries of the world, including India (Figure 4-47). Facebook Messenger is the most popular in 39 countries, including the United States. Viber follows as the most popular in 17 countries, including Ukraine. WeChat is the most popular messaging app only in China, but it ranks among the world's most widely used messaging app because China accounts for 18 percent of the world's population (Figure 4-48).



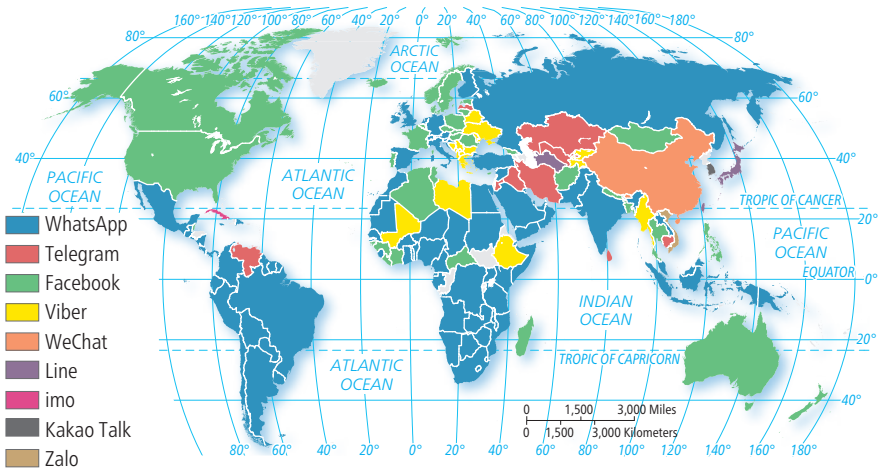
▲ **FIGURE 4-44 YOUTUBE USERS BY COUNTRY**



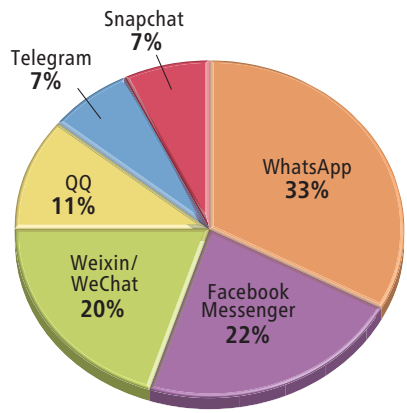
▲ **FIGURE 4-45 INSTAGRAM USERS BY COUNTRY**



▲ **FIGURE 4-46 WHATSAPP USERS BY COUNTRY**



▲ **FIGURE 4-47 MOST POPULAR MESSAGING APP BY COUNTRY**



▲ **FIGURE 4-48 WORLDWIDE SHARE OF MESSAGING APPS**

Challenges in Accessing Electronic Media

Learning Outcome 4.3.3 Evaluate threats to freedom in the use of electronic media.

Most Americans take for granted access to information and communications through the internet and cellular phones. This free access is not found in many other countries.

Freedom House, a U.S.-based research institute for the study of democracy, political freedom, and human rights, has a project called Freedom on the Net that measures the level of internet and digital media freedom in 70 countries. Excluded are countries with limited internet connectivity (mostly in Africa) and countries with internet connectivity but insufficient evidence on the level of freedom in internet use (mostly in Europe). Each of the 70 countries receives a numerical score from 0 (the least free) to 100 (the most free).

Countries are classified "free" with a score of 70 or above, "partly free" with a score between 40 and 69, and "not free" with a score below 40. Only 18 of the 70 countries included in Freedom on the Net in 2021 were classified as "free," 31 were "partly free," and 21 were "not free" (Figure 4-49).

China was ranked the least free country with a score of only 10. Russia had been classified as "not free," in 2021, even before its attack on Ukraine, when it initiated a crackdown on social media. In 2021, Ukraine had been classified as "partly free."

Progress toward more freedom has not been achieved recently. Between 2020 and 2021, 30 countries (including the United States) experienced a decline in their Freedom on the Net score, whereas only 18 registered gains (Figure 4-50).

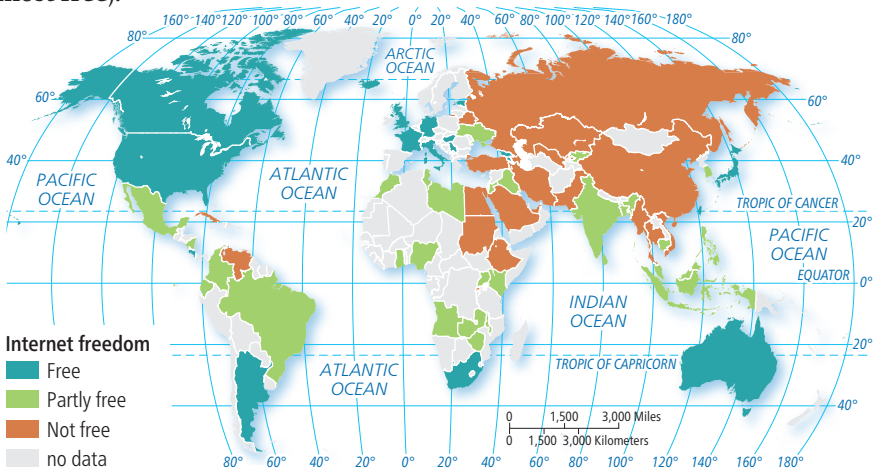
Banned Technology

In countries lacking complete internet freedom, some models of phones, tablets, and computers may not be sold. Devices that are sold must be configured to exclude certain applications and technologies.

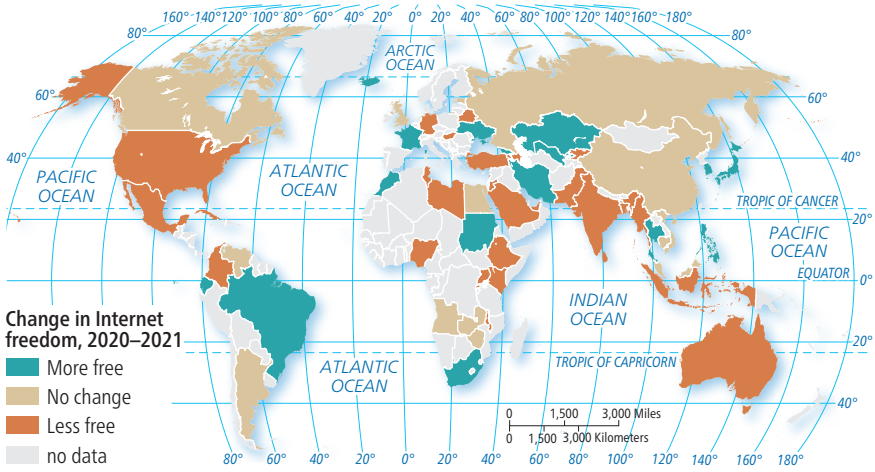
During the twentieth century, governments tried to jam foreign radio stations, especially those of enemy combatants during wartime. But this proved difficult at night, when radio waves carry further. During the Cold War, communist countries in Eastern Europe blocked TV signals from stations in Western Europe. Because over-the-air TV signals do not travel far, this proved easier for communist governments than blocking radio signals. Ultimately, satellite technology enabled consumers to outwit government controls. The small size of satellite dishes made them easy to smuggle into a country and to be erected out of sight.

Now, however, governments can effectively prevent unwanted electronic technology by regulating the most commonly used technology platforms that are supported by the infrastructure in the country. Even some travelers between free countries, such as from the United States to Western European countries, find that their electronic devices do not always operate because of incompatible cellular infrastructure.

China is especially aggressive at restricting foreign applications. The small number of Facebook, YouTube, Instagram, and WhatsApp users in China, displayed in Figures 4-40, 4-44, 4-45, and 4-46, is evidence of those restrictions. Instead, electronic interaction in China is undertaken primarily through home-grown apps, such as WeChat, Weibo, and QQ.



▲ **FIGURE 4-49 INTERNET FREEDOM** Freedom House determines the degree to which countries restrict internet freedom based on a combination of inability to use technology, lack of access to electronic sites, and extent of violation of personal rights.



▲ **FIGURE 4-50 CHANGE IN INTERNET FREEDOM** More countries experienced a decline in internet freedom between 2020 and 2021 than did those that experienced an improvement.

Blocked Content

Some websites are censored or prevented from being seen altogether on devices in particular countries. As with technology, blocking internet content is a continuation of the widespread control practices related to TV.

Three developed countries – Japan, the United Kingdom, and the United States – have dominated TV in developing countries, including supplying much of the programming. Leaders of many developing countries view American control of much of the world's TV programming as a new method of economic and cultural imperialism. American TV programs present characteristically American beliefs and social norms, such as upward social mobility, relative freedom for women, glorification of youth, and stylized violence. These attractive themes may conflict with and drive out traditional folk culture.

To show sensitivity to traditional folk culture, many satellite and cable providers in developing countries block offending networks such as MTV and censor unacceptable programs. The entertainment programs that are substituted may emphasize local values and avoid controversial or edgy cultural, economic, and political content.

In the twenty-first century, concern with American-produced media content has spilled over into the internet. OpenNetInitiative has identified three types of internet content that are routinely censored in other countries.

- Political content that expresses views in opposition to those of the current government or that is related to human rights, freedom of expression, minority rights, and religious movements (Figure 4-51).
- Social content related to sexuality, gambling, and illegal drugs and alcohol as well as other topics that may be socially sensitive or perceived as offensive.
- Security content related to armed conflicts, border disputes, separatist movements, and militant groups.

▲ **FIGURE 4-51 SOCIAL MEDIA AND POLITICAL PROTEST** Protest held in Tbilisi, Georgia, against the Russian invasion of Ukraine.

Google, the world's most widely used search engine, has come under especially strong criticism for limiting its functionality in some countries by failing to display or provide a link to websites that a government does not wish to be seen by users in that country. The company has struggled to comply with the strict control over social media exercised by China's government.

Users' Rights

Individuals are harassed or jailed for online activity deemed unacceptable by authorities. However, governments are finding it increasingly difficult to stop the diffusion of technology. Their citizens are finding ways to circumvent government restrictions on ownership of hardware, use of software, and viewing of online content.

Instead, according to Freedom House, governments are turning to harassing their citizens through physical attacks and imprisonment because of their internet activity. In some countries, governments have enacted laws that provide a justification for attacks. For example, a law in The Gambia makes it a criminal offense to use the internet to criticize public officials. A law in Ethiopia permits the government to search computers, internet sites, and other social media for anything that it considers damaging to the country.

A number of countries require transnational corporations to maintain a local server in order to do business there. The government has the right to access the data that are stored on the local server.

Freedom House has also determined that women and the LGBTQ communities have been targeted in a number of countries for their online activities. For example, two women in Egypt were sent to prison for sharing TikTok videos that encouraged women to pursue careers on social media platforms. Gay men in Russia have been lured through social media to in-person meetings, where they are assaulted by hate groups.

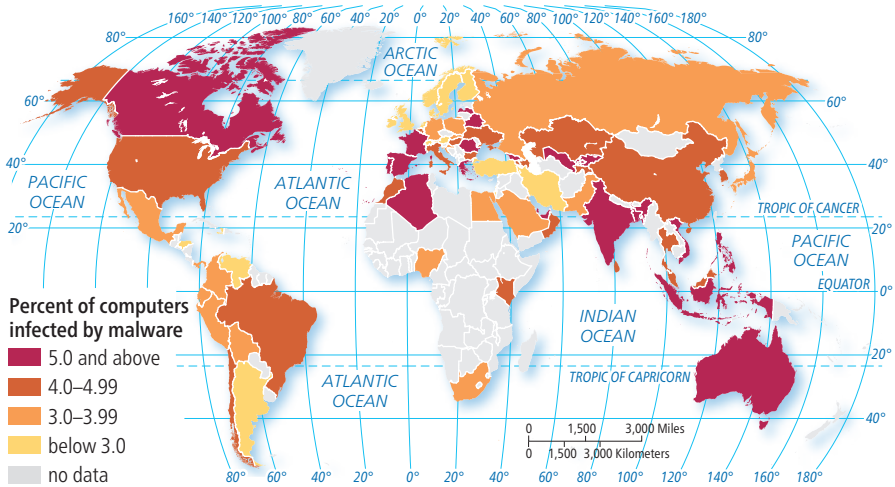
Freedom House has ranked China as the worst country for internet freedom every year since 2014. Freedom House cites actions by Chinese authorities to impose lengthy prison terms for online dissent and to censor independent reporting on such topics as the COVID-19 pandemic.

Freedom House considers Myanmar, Belarus, and Uganda to be the three countries where internet freedom has suffered the most severe declines in recent years. After a military coup following a disputed election, Myanmar's government cut off internet service, blocked social media, shut down independent online news outlets, forced service providers to hand over personal data, and seized control of the telecommunications infrastructure. Government actions to shut down independent social media following disputed elections also occurred in Belarus and Uganda.

Pause & Reflect 4.3.3 If you lived in what the organization Freedom on the Net designates as a "not free" country, what use of electronic media might get you into trouble? Why?

Spatial Dimensions to Cyberattacks

Learning Outcome 4.3.4 Describe geographic features of cyberattacks and other misuse of social media.

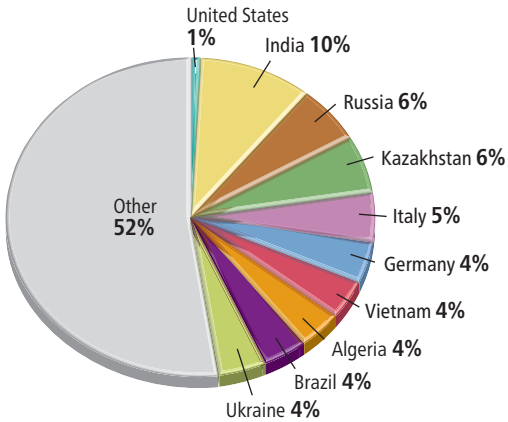


▲ **FIGURE 4-52 DISTRIBUTION OF MALWARE INFECTION**

Social media and electronic devices make it easier for people to interact across the distance of space with friends and businesses. At the same time, criminals have learned to take advantage of hardware and software for launching attacks against individuals, communities, organizations, and institutions. These cyberattacks successfully compromise individual privacy, penetrate national and corporate security, and disseminate deliberately false information. Through cyberattacks, perpetrators are able to make money, influence decision-making, and alter the outcome of elections. Most victims of cyberattacks are clustered in a handful of countries. The most adversely affected countries vary depending on the nature of the attack.

Malware

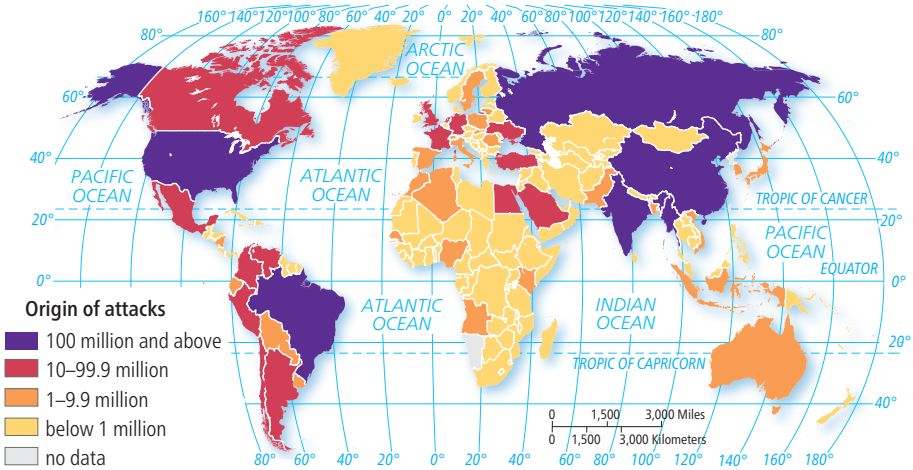
Malware, or **malicious software**, is hostile or intrusive software designed to cause intentional harm. Malware takes control of a victim's computers in order to steal personal, financial, or business information. Figure 4-52 shows the countries that have had the lowest and highest rates of malware infection.



▶ **FIGURE 4-53 VICTIMS OF RANSOMWARE ATTACKS BY COUNTRY**

Ransomware

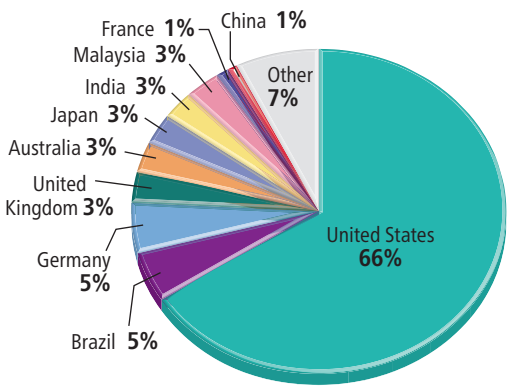
Ransomware, or **cryptoviral extortion**, is a form of malware that encrypts the victim's computer files, making them inaccessible, until a ransom is paid to decrypt them. Ten countries, led by India, Russia, and Kazakhstan, account for around one-half of the victims (Figure 4-53). One example was a ransomware attack on the computer equipment managing a pipeline of Colonial Pipeline that disrupted the distribution of gasoline to airports and filling stations in the Southeast of the United States. The FBI recovered most of the ransom and identified the responsible party as a criminal hacking group called DarkSide, probably based in Russia.



▲ **FIGURE 4-54 COUNTRY OF ORIGIN FOR ATTACKS ON APPS**

Web Application Attack

A **web application attack** is an exploitation of a vulnerability in the coding of an app in order to gain access to a database. Through an app attack, a criminal can gain access to sensitive personal information. United States is the country most victimized by attacks on web applications (Figure 4-54). The United States is also the most frequent country of origin for such attacks (Figure 4-55).

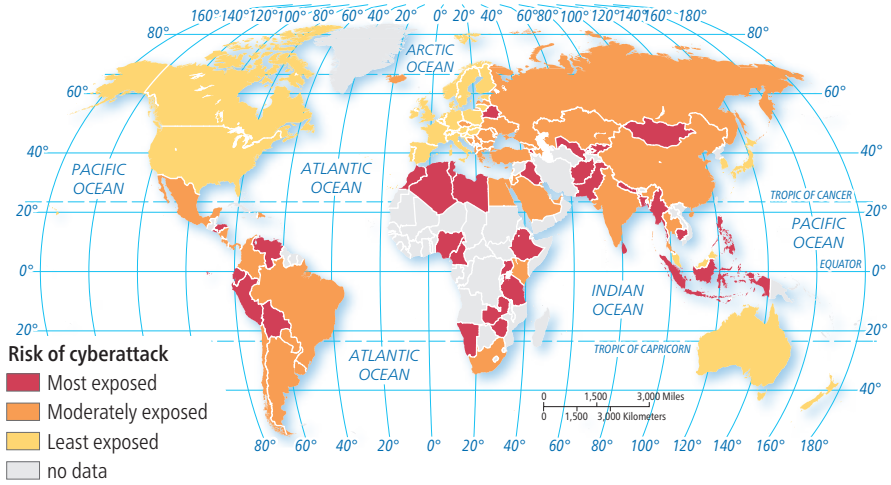


▶ **FIGURE 4-55 VICTIMS OF WEB APPLICATION ATTACKS BY COUNTRY**

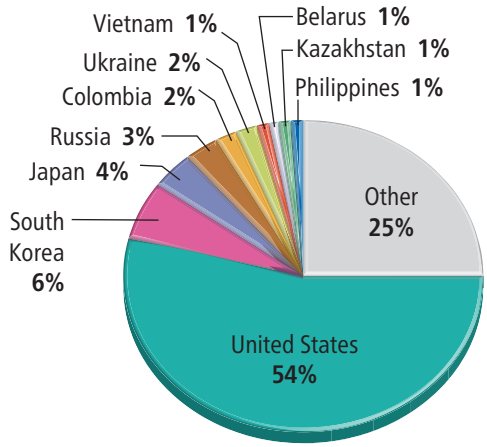
Cyber Espionage

Cyber espionage is the unauthorized and clandestine deployment of a virus to observe or destroy data in the computer systems of government agencies and large corporations. Countries that have been most affected by cyber espionage are displayed in Figure 4-56 and 4-57. Government agencies and corporations in the United States have been by far the most affected by cyber espionage.

Given the rapid rise in cyberattacks, international organizations have started to measure the ability of countries to withstand cyberattacks. Countries are not equally prepared. Rapid7, a private company, assesses readiness through such measures as the number of unsecured server ports and out-of-date encryption. Figure 4-56 shows the countries judged least and most exposed to cyberattacks. The Global Cybersecurity Index (GCI), constructed by the United Nations International Telecommunication Union (ITU), incorporates five measures: strength of legislation to fight cybercriminals, the presence of a response team in case of attack, a strategy to respond to an attack, a program to increase public awareness of the threat, and structures to cooperate with other countries.



▲ **FIGURE 4-56 COUNTRIES LEAST AND MOST EXPOSED TO CYBERATTACKS**



▲ **FIGURE 4-57 VICTIMS OF CYBER ESPIONAGE BY COUNTRY**

Fake News & Alternative Facts

Fake news is a false, often sensational, report disseminated under the guise of an authentic news report. Creators of fake news disseminate information that they know to be untruthful in order to maliciously spread misinformation and mislead consumers of the content. Elected officials and other political leaders may use the term "fake news" to describe press coverage unfavorable to them. Governments may take steps to minimize unfavorable comments disseminated through social media (Figure 4-58).

The rise of fake news has generated other practices that misuse social media. An **alternative fact**, or **alt fact**, is a statement that can be proved to be false. **Trolling** is the practice of posting deliberately inflammatory, extraneous, or off-topic messages in social media in order to provoke quarrels or otherwise agitate people.

The lesson from fake news and alt facts: If we are motivated to like or dislike someone or something, we are more likely to accept or reject fake news about it. If information is shared from someone we know, such as a friend on Facebook, we are more likely to believe it and not check its source. In a world with more fake news and alt facts, individuals and communities have a greater burden to verify and fact-check ourselves.

▼ **FIGURE 4-58 CYBERSPACE ADMINISTRATION, BEIJING, CHINA** Cyberspace Administration is the central internet regulator, censor, oversight, and control agency for the People's Republic of China.

KEY ISSUE

4.4 | Why Do Cultures Face Sustainability Challenges?

Elements of folk and popular culture face challenges in maintaining identities that are sustainable into the future. For folk culture, the main challenge is to maintain unique local landscapes in an age of globalization. For popular culture, the main challenge derives from unsustainable practices designed to promote uniform landscapes.

Maintaining Unique Folk Culture

Learning Outcome 4.4.1 Summarize challenges for folk culture from diffusion of popular culture.

Many fear the loss of folk culture, especially because rising incomes can fuel demand for the possessions typical of popular culture. When people turn from folk to popular culture, they may also turn away from the society's traditional values. And the diffusion of popular culture from developed countries can lead to dominance of Western perspectives.

Amish Migration: Preserving Cultural Identity

For folk culture, increased connection with popular culture can make it difficult to maintain centuries-old practices. Shunning mechanical and electrical power, the Amish still travel by horse and buggy and continue to use hand tools for farming. The Amish are identifiable by their distinctive clothing and farming practices but have managed to maintain their religious and language customs as well (Figure 4-59).

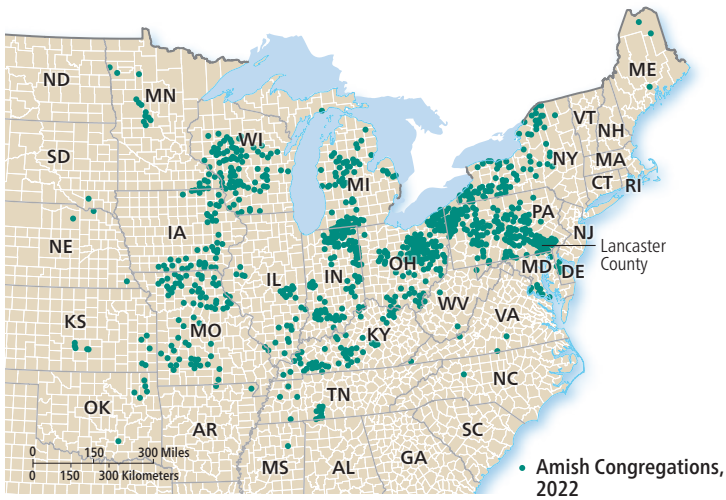
Although the Amish number only about 350,000, their folk culture remains visible on the landscape in around 30 U.S. states (Figure 4-60). The distribution of Amish folk culture across a major portion of the U.S. landscape is explained by examining the diffusion of their culture through migration.

Several hundred Amish families migrated to North America in two waves. The first group, primarily from Bern, Switzerland, and the Palatinate region of southwestern Germany, settled in Pennsylvania in the early 1700s, enticed by colony proprietor William Penn's offer of low-priced land. Around 43,000 Amish currently live in Lancaster County, Pennsylvania. Because of lower land prices, the second group, from Alsace in northeastern France, settled in Ohio, Illinois, and Iowa in the United States and Ontario, Canada, in the early 1800s. From these core areas, groups of Amish migrated to other locations where inexpensive land was available.

According to Amish tradition, every son is given a farm when he is an adult, but land suitable for farming is expensive and hard to find in Lancaster County because of its proximity to growing metropolitan areas. With the average price of farmland in southwestern Kentucky less than one-fifth that in Lancaster County, an Amish family can sell its farm in Pennsylvania and acquire enough land in Kentucky to provide adequate farmland for all the sons. Amish families are also migrating from Lancaster County to escape the influx of tourists who come from the nearby metropolitan areas to gawk at the distinctive folk culture. The geographic diffusion of Amish communities across multiple states has increased the difficulty of their maintaining distinctive cultural identities.

Pause & Reflect 4.4.1 In what ways might Amish people need to interact with popular culture?

▲ **FIGURE 4-59 AMISH** Amish children wear traditional clothing, Lancaster County, Pennsylvania.



▲ **FIGURE 4-60 DISTRIBUTION OF AMISH SETTLEMENTS** Amish settlements are found through the Northeast but are clustered in Indiana, Ohio, and Pennsylvania.

Marriage in India: Challenging Cultural Values

Rapid changes in long-established cultural values can lead to instability and even violence in a society. This threatens not just the institutions of folk culture but the sustainability of the society as a whole.

The global diffusion of popular culture has challenged the subservience of women to men that is embedded in some folk customs. Women may have been traditionally relegated to performing household chores, such as cooking and cleaning, and to bearing and raising children. Those women who worked outside the home were likely to perform agricultural work or trade handicrafts.

Global diffusion of popular social customs has had an unintended negative impact for women in India: an increase in demand for dowries. Traditionally, a dowry was a "gift" from one family to another as a sign of respect. In the past, the local custom in much of India was for the groom to provide a small dowry to the bride's family. In the twentieth century, the custom reversed, and the family of a bride was expected to provide a substantial dowry to the husband's family (Figure 4-61).

The government of India enacted anti-dowry laws beginning in 1961, but the ban is widely ignored. In fact, dowries have become much larger in modern India and an important source of income for the groom's family. A dowry can take the form of either cash or expensive consumer goods, such as cars, electronics, and household appliances.

If the bride's family is unable to pay a promised dowry or installments, the groom's family may cast the bride out on the street, and her family may refuse to take her back. Husbands and in-laws angry over the small size of dowry payments killed around 6,800 women in India in 2021 according to India's National Crime Records Bureau.

The Future of Folk Culture

Folk cultural traditions are increasingly subject to influences from the outside world as people migrate for economic opportunities and opt for less expensive and more appealing alternatives that are available as a result of international trade. Movie watchers are drawn to the flashiness and high-production quality of Western films. Bamboo—a material traditionally used to build houses in Southeast Asia (Figure 4-62)—may be costlier and less reliable than using concrete blocks (Figure 4-63). Jeans and T-shirts can be less expensive and sometimes more durable than traditional clothing alternatives. These popular culture elements are altering and co-mingling with folk culture, even in remote locations (Figure 4-64).

Historically, the variety of folk cultures was a key ingredient ensuring diverse identities and opinions. Folk culture is challenged to preserve the vibrancy and diversity that existed before global economic and communication systems came into being.

▼ **FIGURE 4-61 RALLY AGAINST DOWRY, INDIA**

▲ **FIGURE 4-62 TRADITIONAL HOUSING MADE OF BAMBOO** Chiang Mai, Thailand.

▲ **FIGURE 4-63 MODERN CONCRETE HOUSING UNDER CONSTRUCTION** Thailand.

▼ **FIGURE 4-64 MIXING FOLK AND POPULAR CULTURE** Buddhist monks and nuns from Myanmar wear traditional clothing and check their smartphones while visiting Sri Lanka.

Uniform Landscapes of Popular Cultures

Learning Outcome 4.4.2 Summarize two principal ways that popular culture can adversely affect the landscape.

The distribution of popular culture around the world tends to produce more uniform landscapes. The spatial expression of a popular custom in one location will be similar to another. In fact, promoters of popular culture want a uniform appearance to generate "product recognition" and greater consumption.

Over time, the uniform landscapes of popular culture replace folk landscapes and offer a different set of cultural experiences to inhabitants. The diffusion of fast-food restaurants is a good example of such uniformity. A fast-food restaurant is usually organized as a **franchise**, which is an agreement between a corporation and a business owner to market that corporation's products in a local area. The franchise agreement lets the local outlet use the company's name, symbols, trademarks, methods, and architectural styles. A uniform sign is prominently displayed.

The success of fast-food restaurants depends on large-scale mobility: People who travel or move to another city immediately recognize a familiar place. To both local residents and travelers, the local franchise is immediately recognizable as part of a national or multinational company. Visitors can be confident that the restaurant will reflect familiar values of international popular culture rather than strange and potentially uncomfortable local customs.

Golf

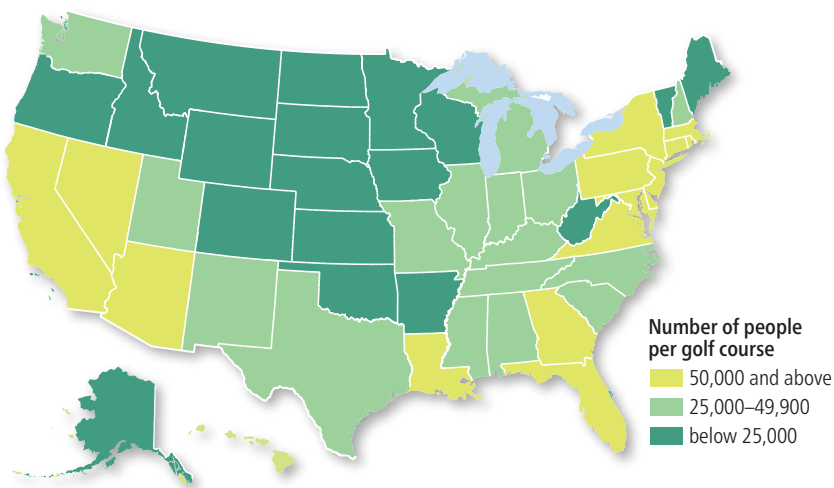
Popular culture can pollute the landscape by modifying it with little regard for local environmental conditions, such as climate and soil. To create a uniform landscape, hills may be flattened and valleys filled in. The same building and landscaping materials may be employed regardless of location. Features such as golf courses consume large quantities of land and water. Non-native grass species are planted, and fertilizers and pesticides are laid on the grass to ensure an appearance considered suitable for the game (Figure 4-65).

Golf courses, because of their large size (60 hectares, or 150 acres), provide a prominent example of imposing popular culture on the environment. A surge in U.S. golf popularity spawned construction of several hundred courses during the late twentieth century. Geographer John Rooney attributed this to increased income and leisure time, especially among recently retired older people and younger people with flexible working hours. This trend has slowed during the twenty-first century.

The distribution of golf courses is not uniform across the United States. Although golf is perceived as a warm-weather sport, the number of people per golf course is actually lowest in north-central states (Figure 4-66). People in these regions have a long tradition of playing golf, and social clubs with golf courses are important institutions in the fabric of the region's popular customs. Florida has the most golf courses, but it is also the third most populous state, so its ratio of people to golf courses is less favorable than in the north-central states.

Golf courses are designed partially in response to local physical conditions. Grass species are selected to thrive in the local climate and still be suitable for the needs of greens, fairways, and roughs. Existing trees and native vegetation are retained if possible. (Few fairways in Michigan are lined with palms.) Yet, as with other popular customs, golf courses remake the environment – creating or flattening hills, cutting grass or letting it grow tall, carting in or digging up sand for traps, and draining or expanding bodies of water to create hazards and maintain the course.

▲ **FIGURE 4-65 GOLF COURSE IN NAMIBIA**



▲ **FIGURE 4-66 GOLF COURSES IN THE UNITED STATES**

Cultural Convergence

Physical expression of uniformity in popular culture has diffused from North America to other parts of the world. American motels and fast-food chains have opened in other countries. These establishments appeal to North American travelers, yet most customers are local residents who wish to sample American customs they have seen on television. Some critics view expansion by American retail businesses as a form of cultural imperialism.

For popular culture, the challenges derive from the sustainability of practices designed to promote uniform landscapes and experiences. Popular culture can significantly modify or control the environment. It may be imposed on the environment rather than spring forth from it, as with many folk customs.

In order to enjoy some popular customs, the environment must be modified. To enable participation in a leisure activity, the environment is sometimes dramatically altered. Even if the resulting built environment may be difficult to visually differentiate from its "natural," equivalent, it is actually the result of deliberate modifications of the landscape by people in pursuit of popular social customs.

The spread of a popular culture product across larger spaces results in a loss of localized folk culture diversity and convergence of cultural preferences. This process is known as **cultural homogenization**. Some question the actions of Western countries, who have been most successful in commodifying and exporting elements of their popular culture because the resulting dominance of their values is regarded as a form of cultural imperialism.

The diffusion of some popular customs can adversely impact environmental quality and cultural diversity in multiple ways:

- Pollution of the landscape.
- Depletion of scarce natural resources.
- Crowding-out of locally owned businesses.

Snow Skiing in the Desert

The United Arab Emirates (UAE) is one of the world's wealthiest countries, thanks to its supply of petroleum, which it sells to other countries. Its population of around 1 million Emirati citizens is joined by around 9 million citizens of other countries who have immigrated to the UAE to work in the oil fields as well as local services.

Energy consumption per capita in the UAE is one of the highest in the world, and its generation of pollution is also one of the world's highest per capita. The country uses its petroleum to generate nearly all its electricity as well as to export to pay for the high standard of living that consumes a lot of resources per capita.

The temperature in the United Arab Emirates (UAE) exceeds 100°F (38°C) much of the year, but people can snow ski year-round indoors in a structure attached to the Mall of the Emirates, one of the largest shopping malls in the world, located in the center of the capital Dubai (Figure 4-67).

The mall has an indoor mountain 85 meters (280 feet) high, with five slopes of varying difficulty accessed through lifts. Sledding, tobogganing, and snowboarding are also available. Visitors to Ski Dubai can also have close encounters with penguins that are let out of their enclosures several times a day.

Because few residents of the UAE even own winter clothing, let alone skis, winter clothing is included in the price of admission, along with equipment. Gender roles prevalent in some countries of Southwest Asia limit women's participation in sports, but UAE women are permitted to ski and participate in the other activities at Ski Dubai (Figure 4-68).

▲ **FIGURE 4-67 MALL OF THE EMIRATES** A ski slope is located inside the sloped structure.

▲ **FIGURE 4-68 SKI DUBAI**

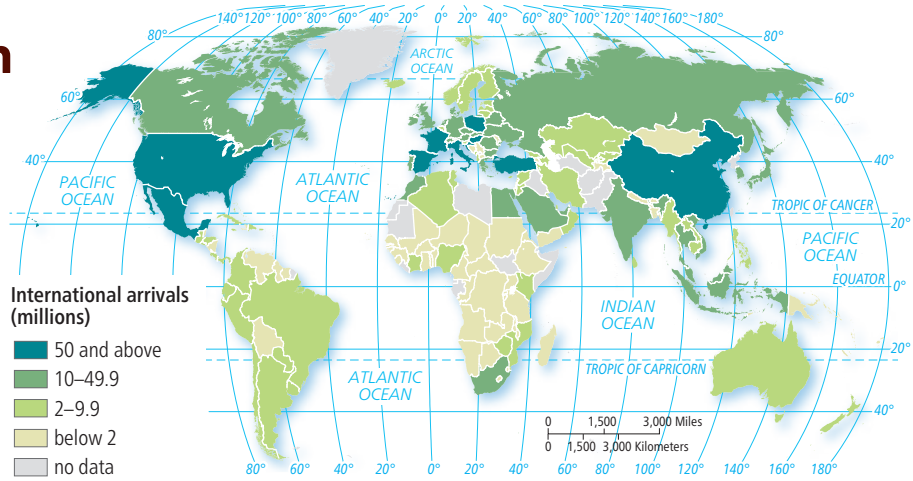
Tourism & Overtourism

Learning Outcome 4.4.3 Describe the importance of travel in the formation of popular culture landscapes.

Travel plays an increasingly important role in refashioning the landscape in the service of popular culture. At its best, travel offers people the opportunity to learn about other cultures firsthand.

The hospitality industry, including transportation as well as hotels and restaurants, has become the world's largest industry in many respects, such as employment and spending. The service sector of the economies of these countries is increasingly organized around travel and tourism.

Most international tourists travel from one developed country to another, such as between the United States and Western Europe (Figure 4-69). In 2019, the last year prior to the impact of the COVID-19 pandemic, the countries that received the most visitors were France and Spain. The most popular destinations in France were in the Paris region, including Disneyland Paris, the Louvre Museum, the Palace of Versailles, and the Eiffel Tower. The most popular destinations in Spain include the Sagrada Família basilica in Barcelona, El Retiro park in Madrid, the Plaza de España in Seville, and the Ciutat de les Arts i les Ciències (City of Arts and Sciences) in Valencia.



▲ **FIGURE 4-69 INTERNATIONAL TOURIST ARRIVALS** Data are for 2019, before the start of the COVID-19 pandemic.

▲ **FIGURE 4-70 OVERTOURISM: VENICE** Huge cruise ship docks in the center of Venice, Italy.

Overtourism

Many cities in Europe have struggled with **overtourism**, which is the phenomenon whereby certain places of interest are visited by excessive numbers of tourists, causing undesirable effects for the places visited. Venice, which suffers from overtourism, has tried to limit the numbers of tourists by keeping out very large cruise ships (Figure 4-70). Cities including Amsterdam and Barcelona are trying to reduce the number of Airbnb lodgings (Figure 4-71).

▶ **FIGURE 4-71 OVERTOURISM: BARCELONA**

Tourism & Cultural Interaction

Most international tourists originate in developed countries and vacation in developed countries. However, tourism has become important for developing countries as a source of funds to improve conditions for their citizens.

Tourists from developed countries take vacations in developing countries in part to experience cultural features distinctive from those in their home countries. At the same time, though, tourists from developed countries who visit developing countries usually stay in hotels and eat meals that have features and levels of comfort comparable to those found in developed countries. Visitors from developed countries rarely see evidence of impoverished living conditions in developing countries.

Several alternative forms of tourism in developing countries are available for visitors from developed countries. These include responsible tourism, ecotourism, and volunteer tourism.

Responsible Tourism

The 2002 World Summit on Sustainable Development defined **responsible tourism** as travel and tourism that:

- Minimizes negative economic, environmental and social impacts.
- Generates greater economic benefits for local people and enhances the well-being of host communities.
- Improves working conditions and access to the industry.
- Involves local people in decisions that affect their lives and life changes.
- Makes positive contributions to the conservation of natural and cultural heritage, to the maintenance of the world's diversity.
- Provides more enjoyable experiences for tourists through more meaningful connections with local people and a greater understanding of local cultural, social, and environmental issues.
- Provides access to the tourism industry for people with disabilities and the disadvantaged.
- Is culturally sensitive, engenders respect between tourists and hosts, and builds local pride and confidence.

An example of responsible tourism is Trash Hero, a program started in Thailand. Tourists and local residents jointly clean up trash from the beaches (Figure 4-72).

Ecotourism

The International Ecotourism Society (IES) defines **ecotourism** as responsible travel to natural areas that conserves the environment, sustains the well-being of local people, and involves interpretation and education. Ecotourism has benefited countries such as Madagascar, Ecuador, Kenya, and Costa Rica, where natural environments are threatened (Figure 4-73). The IES judges a trip to be a good example of ecotourism if it meets the following criteria:

- The destination is a feature of the natural environment.
- Impacts on the local environment are minimized.
- Building environmental awareness is a component of the trip.
- Direct financial benefits for conservation result from the trip.
- Local people receive financial benefits and greater empowerment from the trip.
- Local cultural traditions are respected.
- Human rights and democratic movements are supported.

Voluntourism

Voluntourism (a combination of the words *volunteer* and *tourism*) is a form of tourism in which travelers participate in voluntary work, typically for a nonprofit organization. The work typically comprises a form of community welfare such as childcare, teaching a foreign language, hospital support, and coaching sports (Figure 4-74).

▲ **FIGURE 4-72 RESPONSIBLE TOURISM** Tourists and local residents jointly clean up the beach, Ban Krut, Thailand.

▲ **FIGURE 4-73 ECOTOURISM** Hiking in Costa Rica.

▲ **FIGURE 4-74 VOLUNTOURISM** Teaching reading to children, Uganda.

4 Summary & Review

KEY ISSUE

4.1 | Where Are Cultural Activities Distributed?

- Folk culture and popular culture have distinctive patterns of origin, diffusion, and distribution.
- Electronic communications and social media facilitate the diffusion of cultural elements.

KEY ISSUE

4.2 | Why Might Culture Diffuse?

- Regional variations in folk culture, including food, clothing, shelter, arts, and leisure activities, can derive from the physical environment as well as from religion and other cultural values.
- Preferences in popular culture, including food, clothing, shelter, arts, and leisure activities, vary more in time than in place, though some regional variations in preferences persist.

KEY ISSUE

4.3 | Why Is Access to Culture Unequal?

- Popular culture diffuses primarily through electronic media.
- Many countries limit the ability of their citizens to access electronic media.
- Cyberattacks and other misuse of social media have distinctive distributions of origin and targets.

KEY ISSUE

4.4 | Why Do Cultures Face Sustainability Challenges?

- Folk culture faces loss of traditional values in the face of rapid diffusion of popular culture.
- Popular culture can produce uniform landscapes, but some popular culture features display greater diversity.
- International tourism can lead to an excessive number of visitors in some locations, whereas other locations can benefit from responsible tourism, ecotourism, and voluntourism.

Thinking Geographically

KEY ISSUE

4.1 | Where Are Cultural Activities Distributed?

Mapping services such as Google Maps and Bing Maps have extensive street view coverage in the developed regions of North America and Europe but remain spotty in the developing regions of Africa and Asia. What factors might account for these differences in coverage?

▲ **FIGURE 4CR-1** GOOGLE STREET MAPPING, LONDON

KEY ISSUE

4.2 | Why Might Culture Diffuse?

Calcio Fiorentino is a form of soccer originating in Italy 500 years ago. Based on this photo, what are some differences between Calcio Fiorentino and modern soccer? What geographic processes of origin, diffusion, and distribution might help to explain why Calcio Fiorentino is not the predominant form of modern soccer?

▲ **FIGURE 4CR-2** CALCIO FIORENTINO FOOTBALL

KEY ISSUE

4.3 | Why Is Access to Culture Unequal?

Consider the social media platforms that are most significant to you. How might the organization of your social life and consumption of media change if you and your friends were not able to access these platforms? What challenges would you encounter if you suddenly lost access to these platforms in an emergency situation?

▲ **FIGURE 4CR-3** ACCESS DENIED

KEY ISSUE

4.4 | Why Do Cultures Face Sustainability Challenges?

Voluntourism is a way to work in another country and interact with people of other cultures. Is this form of cultural convergence more sustainable than other forms of international tourism? Why or why not?

▲ **FIGURE 4CR-4** VOLUNTOURISM, LAGOS, NIGERIA

Key Terms

Alternative fact (or **alt fact)** A statement that can be proved to be false.

Cultural homogenization The process of reduction in cultural diversity through the diffusion of popular culture.

Custom The frequent repetition of an act, to the extent that it becomes characteristic of the group of people performing the act.

Cyber espionage The unauthorized and clandestine deployment of a computer virus to observe or destroy data in the computer systems of government agencies and large corporations.

Ecotourism Responsible travel to natural areas that conserves the environment, sustains the well-being of local people, and involves interpretation and education.

Esports Sports competitions using video games.

Fake news A false report disseminated under the guise of an authentic news report, created to maliciously spread misinformation and mislead consumers of the content.

Folk culture Culture traditionally practiced by a small, homogeneous, rural group living in relative isolation from other groups.

Franchise An agreement between a corporation and a business owner to market that corporation's products in a local area.

Habit A repetitive act performed by a particular individual.

Malware (or **malicious software)** Hostile or intrusive computer software designed to cause intentional harm.

Overtourism A phenomenon whereby certain places of interest are visited by excessive numbers of tourists, causing undesirable effects for the places visited.

Popular culture Culture found in a large, heterogeneous society that shares certain habits and seeks similar material goods despite differences in other personal characteristics.

Ransomware (or **cryptoviral extortion)** A form of malware that encrypts the victim's computer files, making them inaccessible, until a ransom is paid to decrypt them.

Responsible tourism Tourism that minimizes negative economic, environmental, and social impacts and generates greater benefits for local people.

Taboo A restriction on behavior imposed by social custom.

Terroir The contribution of a location's distinctive environment to the way food produced there tastes.

Trolling The practice of posting deliberately inflammatory, extraneous, or off-topic messages in social media in order to provoke quarrels or otherwise upset people.

Voluntourism A form of tourism in which travelers participate in voluntary work, typically for a nonprofit organization.

Web application attack An exploitation of a vulnerability in the coding of an app in order to gain access to a database.

International Geographic Mapping Explorations

Rice: From Field to Dinner

People do not simply eat what is available in their particular environment. Food preferences are strongly influenced by cultural traditions. What is eaten establishes one's social, religious, and ethnic memberships. For many people, especially those living in Asia, rice is the most important source of food. A bowl of rice is a familiar feature in many meals around the world (Figure 4CR-5). Producing rice is a very complex and time-consuming process, involving many steps (Figure 4CR-6).

▲ **FIGURE 4CR-5 HARVESTING RICE** Bali, Indonesia.

▲ **FIGURE 4CR-6 STEAMED RICE WITH PORK AND VEGETABLES** Traditional food in Bali, Indonesia.

. . . . Folk and popular culture have different geographical features relating to origin, diffusion, and distribution. Increasingly, cultural features are being distributed through social media. The language most commonly used to distribute social media is English, as we will see in the next chapter, Languages. . . .

5 Languages

KEY ISSUES

5.1 Where Are Languages Distributed?

A language can be classified as belonging to a family of languages. Individual languages and language families display distinctive distributions.

5.2 Why Do Languages Diffuse?

Like other cultural features, the contemporary distribution of languages results from processes of origin and diffusion.

5.3 Why Do Languages Vary Among Places?

Geographers observe variations within a language. In some countries, multiple languages are spoken.

5.4 Why Do Languages Survive or Perish?

The list of world languages is in constant flux. Some lesser-used languages are disappearing, whereas others are being preserved and invented.

▶ Sign language, Cape Town, South Africa school.

Language is an important part of cultural identity. It is the means through which other cultural values are communicated. People are trying to preserve local languages as one of the basic elements of cultural identity. At the same time, people around the world are learning English to participate in a global economy and culture. In Europe, for example, where multiple languages are spoken, 96 percent of high school students learn English. In contrast, only 20 percent of students in the United States take a course to learn another language in high school.

LOCATIONS EXPLORED IN THIS CHAPTER

KEY ISSUE

5.1 | Where Are Languages Distributed?

As defined in Chapter 1, *culture* is the body of material traits, customary beliefs, and social forms that together contribute to the distinct identity of a group of people. Chapter 4 looked at the material possessions of culture. This chapter and the next two discuss three traits that shape cultural values and beliefs: language, religion, and ethnicity.

Languages & Geography

Learning Outcome 5.1.1 Explain how geographers classify languages.

We start our study of the geographic elements of cultural values and beliefs with language in part because language is the means through which other cultural values and beliefs, such as religion and ethnicity, are communicated. **Language** is a system of communication through speech, movement, sounds, or symbols that a group of people understands to have the same meaning.

Most people communicate through speech, though some people use symbols or movements, such as sign language. An estimated 500,000 Americans and 72 million people worldwide with disabling hearing loss communicate through sign language.

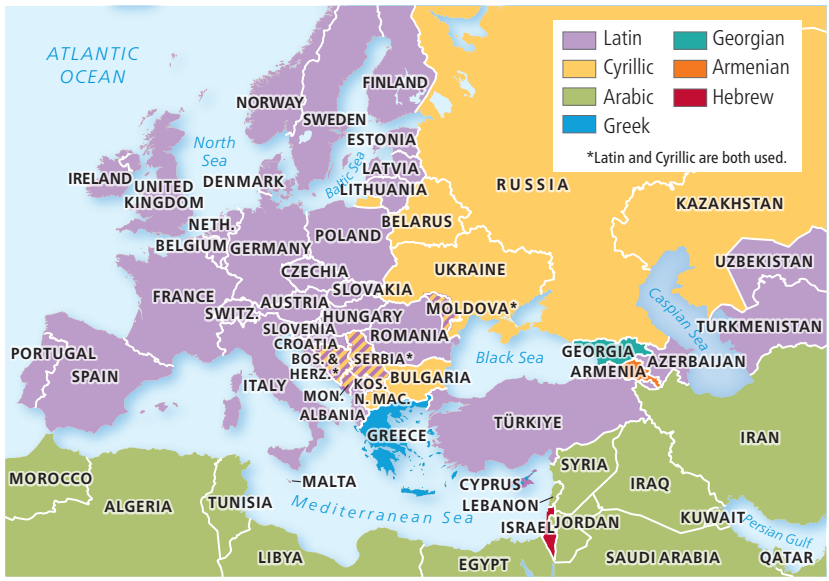
Geographers observe that cultural elements such as language, religion, and ethnicity can be strong centripetal and centrifugal forces, two terms that are adapted from physical science. For geographers, a **centripetal force** is a force that tends to unify people, whereas a **centrifugal force** is a force that tends to pull people apart. Sharing a common language is a good example of a centripetal force. On the other hand, an example of a centrifugal force would be two groups of people living in the same place but using different languages and each group refusing to learn the other's language.

The study of language follows logically from migration because the contemporary distribution of languages around the world is largely a result of past migration of peoples. People in two locations use the same language because of migration from one of the locations to the other. On the other hand, people in two locations use different languages because of lack of interaction between them.

Writing Systems

Ethnologue, one of the most authoritative sources of languages (online at ethnologue.com), estimates that the world has 4,065 languages with a writing system, symbols such as letters in an alphabet that represent words of a language. Two writing systems are shown in Figure 5-1 and seven in Figure 5-2.

▲ **FIGURE 5-1 TWO WRITING SYSTEMS** Sign in Greek and English in a cafe, Argostoli, Greece.



▲ **FIGURE 5-2 WRITING SYSTEMS OF EUROPE AND SOUTHWEST ASIA**

Pause & Reflect 5.1.1 Hebrew is read from right to left, rather than from left to right, as are English and French. What other widely used language shown in Figure 5-2 is also read from right to left?

Status of Languages

Earth's heterogeneous collection of languages is one of its most obvious examples of cultural diversity. *Ethnologue* estimates that the world has 7,151 languages, including 90 used by at least 10 million people, 307 used by between 1 and 10 million people, and 6,754 used by fewer than 1 million people. The distribution of some of these languages is easy for geographers to document, whereas with others – especially in Africa and Asia – it is difficult if not impossible.

Ethnologue identifies the status of a language as institutional, stable, and endangered:

- **Institutional language.** An **institutional language** is used in education, work, mass media, and government. *Ethnologue* identifies 532 institutional languages, including English. An institutional language has a **literary tradition**, which means it is written as well as spoken. Thousands of spoken languages lack a literary tradition. The lack of written records is one reason it is difficult to document the total number of languages or their distribution.
- **Stable language.** A **stable language** is in daily use by people of all ages, from children to elderly individuals. *Ethnologue* distinguishes between a stable developing language, which is in process of developing a literary tradition, and a stable vigorous language, which lacks a literary tradition. *Ethnologue* identifies 1,602 stable developing languages and 1,972 stable vigorous languages. An example of a stable developing language is Sama, spoken by around 260,000 people dispersed across Southeast Asia. Tagin, a language spoken by around 38,000 people in India, is an example of a stable vigorous language (Figure 5-3).
- **Endangered language.** An **endangered language** is threatened or dying because it is losing users and may not be retained by the younger generation. *Ethnologue* considers a language to be threatened if it is used for face-to-face communication but is losing users. An example is Bolinao, spoken by around 56,000 people in the Philippines, a country with a population of 112,500,000 spread over 7,107 islands. A language is considered dying if it is still used by older people but is not being transmitted to children. *Ethnologue* classifies 2,055 languages as threatened and 990 as dying. Some of the threatened and dying languages are being saved, as discussed later in this chapter.

Organizing Languages

The world's languages can be organized into families, branches, and groups.

- A **language family** is a collection of languages related through a common ancestral language that existed long before recorded history. The language family with the most users is Indo-European, which includes English.
- A **language branch** is a collection of languages within a family related through a common ancestral language that existed several thousand years ago; differences are not as extensive or as old as between language families, and archaeological evidence can confirm that the branches derived from the same family. English is in the Germanic branch of the Indo-European language family.
- A **language group** is a collection of languages within a branch that share a common origin in the relatively recent past and display many similarities in grammar and vocabulary. English is in the West Germanic group within the Germanic branch of the Indo-European language family (Figures 5-4 and 5-5).

▲ **FIGURE 5-3 TAGIN** A stable vigorous language, spoken in Itanagar, India.

▲ **FIGURE 5-4 WEST GERMANIC LANGUAGE GROUP** Sign for people to maintain a distance of 1.5 meters (5 feet) during the COVID-19 pandemic in three institutional languages in the West Germanic group (Frisian, Dutch, and English).

▼ **FIGURE 5-5 ENDANGERED WEST GERMANIC GROUP LANGUAGE** Northern Frisian is an endangered language, spoken by only 10,000 people in Germany, including on Amrum Island.

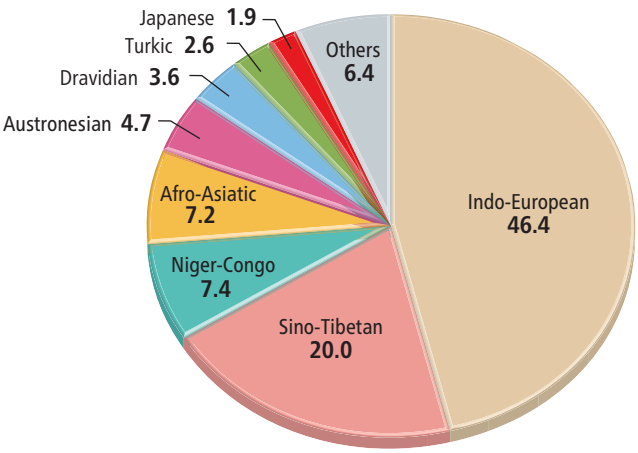
Language Families

Learning Outcome 5.1.2 Identify the world's most used languages and language families.

The several thousand spoken languages can be organized logically into a small number of language families. More than 90 percent of the people in the world use a language that belongs to one of eight language families (Figure 5-6). Two-thirds use a language that belongs to the Indo-European or Sino-Tibetan language family. Six other language families are used by between 2 and 7 percent of the world's people. The remaining 6 percent of the world's people use a language belonging to the other 134 smaller families.

▼ FIGURE 5-6 LANGUAGE FAMILIES BY SHARE OF WORLD POPULATION

(a) Percentage of people who use a language from the largest language families.



(b) Signs in Japanese, Osaka, Japan.

Language Family Trees

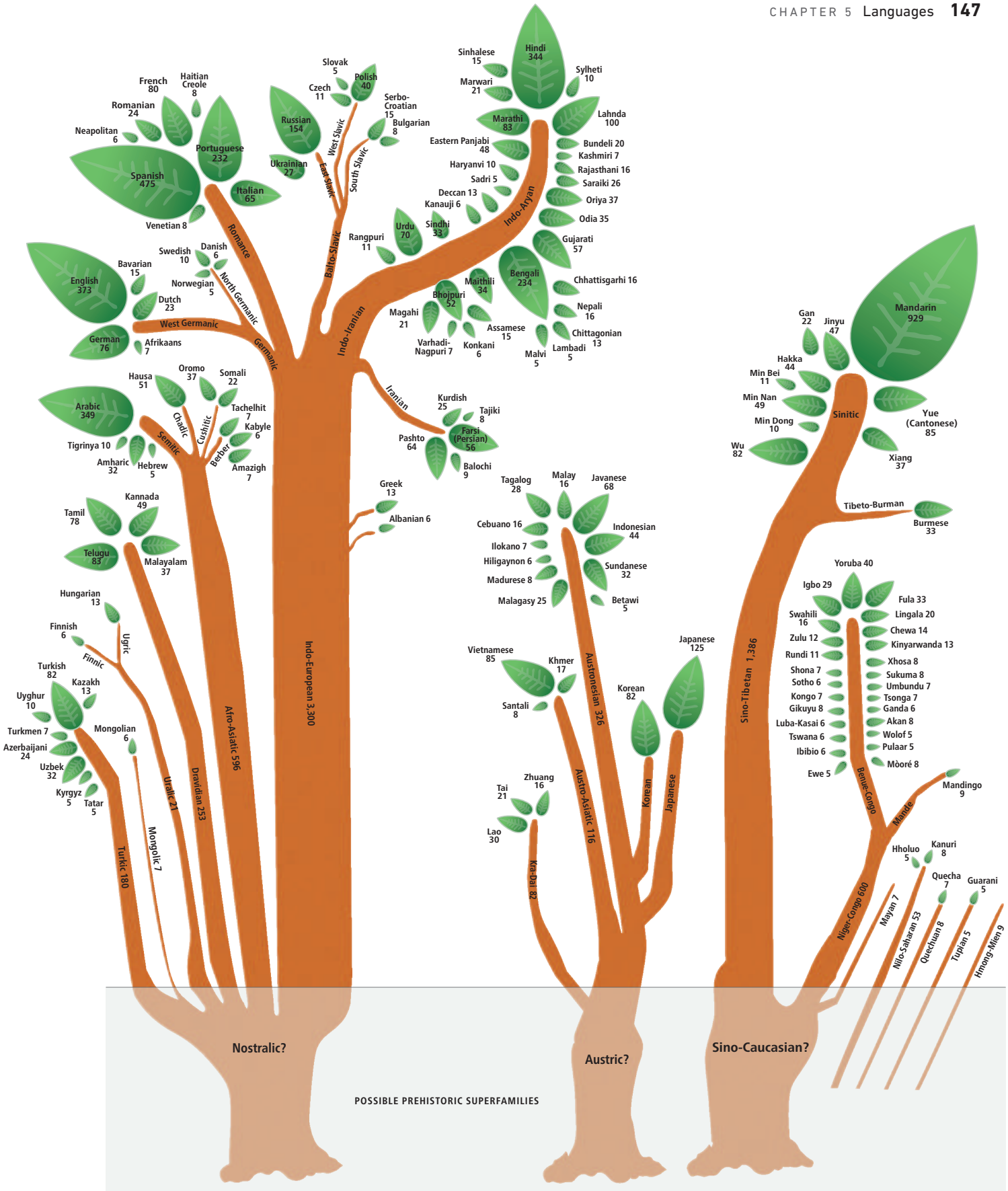
Figure 5-7 (on the next page) depicts the world's major languages and language families as a forest. Individual languages are displayed as leaves. The larger the leaf, the more users of that language. Language families are represented as trunks of the trees, again sized to be proportional to the number of users. Some trunks divide into branches, which logically represent language branches, sized according to the number of users. The branches representing Germanic, Balto-Slavic, and Indo-Iranian in Figure 5-7 divide a second time into language groups. The larger the trunks and leaves are, the greater the number of speakers of those families and languages.

Figure 5-7 displays each language family as a separate tree at ground level. Some **linguists**, specialists in the study of human language, speculate that language families were joined together as a handful of superfamilies tens of thousands of years ago. Superfamilies are shown as roots below the surface because their existence is highly controversial and speculative.

Isolated Languages

Similarities and differences between languages – our main form of communication – are a measure of the degree of interaction among groups of people. Some languages bear no similarity to other languages. Isolation from others has helped to preserve some of these languages, but in other cases, it may hasten their demise. An **isolated language** is a language that is unrelated to any other because it does not share a language family with any other language. An isolated language arises because the speakers of that language have limited interaction with speakers of other languages.

No isolated language appears in Figure 5-7. However, Korean and Japanese come close. The Korean language family includes only two languages: Korean and Jejueo. Jejueo is an endangered language used by only around 5,000 people on Jeju Island. The Japanese family includes twelve languages, including Japanese and eleven endangered languages. Some languages once seen as isolated may be reclassified as small families. This happened with Japanese (now included in the Japonic family along with Ryukyuan languages such as Okinawan).



▲ **FIGURE 5-7 LANGUAGE FAMILY TREE**

Pause & Reflect 5.1.2 Based on Figure 5-7, which four other languages with at least 5 million users belong to the same language family, branch, and group as English?

Distribution of Languages

Learning Outcome 5.1.3 Locate on a map the distribution of principal language families.

The two language families with the most speakers are Indo-European and Sino-Tibetan (Figure 5-8). Language families with at least 8 million native users are shown in Figure 5-9. Individual languages with at least 50 million users are named on the map.

▼ **FIGURE 5-8 TWO LARGEST LANGUAGE FAMILIES** Indo-European (which includes English) and Sino-Tibetan (which includes the Chinese languages) are the two mostly widely used language families.

Indo-European

Indo-European, the most widely used language family, is the predominant one in Europe, South Asia, North America, and Latin America. Indo-European languages are used as first languages by all but a handful of people in the Western Hemisphere.

The three most widely used Indo-European languages are Spanish, English, and Hindi. Northern Canada and most of Alaska appear in Figure 5-9 as "other." These languages would be used as first languages by indigenous peoples, though most would also know an Indo-European language.

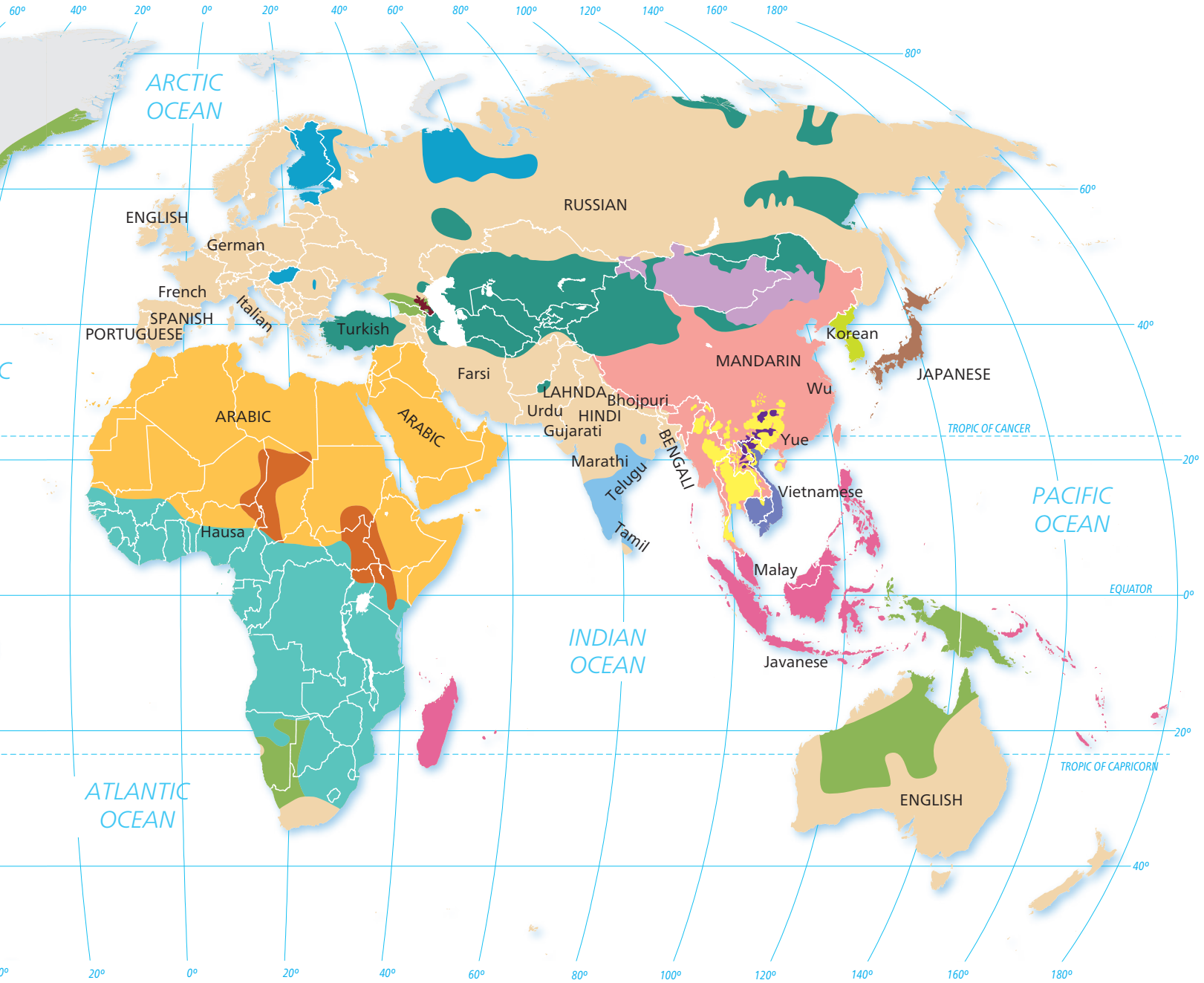
▲ **FIGURE 5-9 DISTRIBUTION OF LANGUAGE FAMILIES**

Sino-Tibetan

The Sino-Tibetan family encompasses languages spoken in the People's Republic of China – the world's most populous state, at 1.4 billion – and in several smaller countries in Southeast Asia. The languages of China generally belong to the Sinitic branch of the Sino-Tibetan family. A second branch, Tibeto-Burman, is the most widely used in Myanmar, which was known as Burma until 1989.

The Chinese languages are written primarily with **logograms**, which are symbols that represent words or meaningful parts of words. Ability to read a book requires understanding several thousand logograms. Most logograms are compounds: words related to bodies of water, for example, include a symbol that represents a river plus additional strokes that alter the river in some way.

Pause & Reflect 5.1.3 Sino-Tibetan is the second-most widely used language family, but it appears on Figure 5-9 to encompass a smaller land area than several other language families. Why is this the case?



Distribution of Indo-European Languages

Learning Outcome 5.1.4 Identify the distribution of Indo-European languages.

The Indo-European language family has eight branches (Figure 5-10). Four of these branches are widely used (Indo-Iranian, Germanic, Romance, and Balto-Slavic). Four branches are used by relatively few people (Albanian, Armenian, Celtic, and Greek). Indo-Iranian speakers account for around half of all Indo-European language users, and Romance languages for around one-fourth.

▲ **FIGURE 5-10 DISTRIBUTION IN EUROPE AND ASIA OF BRANCHES OF THE INDO-EUROPEAN LANGUAGE FAMILY**

◀ **FIGURE 5-11 SCHEDULED LANGUAGES OF INDIA** India recognizes 22 languages, known as scheduled languages, that the government is required to protect and encourage. The most widely used language in India is Hindi, a language in the Indo-Iranian branch of the Indo-European family.

Indo-Iranian Branch

The branch of the Indo-European language family with the most users is Indo-Iranian. The branch is divided into the Iranian (or Western) group and the Indo-Aryan (or Eastern) group. The major Iranian group languages include Persian (sometimes called Farsi) in Iran, Pashto in eastern Afghanistan and western Pakistan, and Kurdish, used by the Kurds of western Iran, northern Iraq, and eastern Türkiye. These languages are written in the Arabic alphabet.

The most widely used language in the Indo-Aryan language group is Hindi, which is the official language of India. India also recognizes 22 so-called scheduled languages, including 15 in the Indo-European language family, 4 in the Dravidian language family, 2 in the Sino-Tibetan language family, and 1 in the Austro-Asiatic language family (Figure 5-11). The government of India is obligated by the country's constitution to encourage the use of these languages. Bengali, the second-most widely spoken Indo-Aryan language, is the official language of Bangladesh. Urdu, though very similar to Hindi, is classified as a distinct language and is Pakistan's official language, although only 8 percent of Pakistanis use it as their first language. Lahnda, another Indo-Aryan language, is the most widely used language in Pakistan.

Germanic Branch

English belongs to the West Germanic language group of the Germanic language branch of the Indo-European language family (Figure 5-12). German and Dutch are also West Germanic group languages. The Germanic language branch also includes languages in the North Germanic group, spoken in Scandinavia. The four Scandinavian languages—Swedish, Danish, Norwegian, and Icelandic—all derive from Old Norse, which was the principal language used throughout Scandinavia before 1000 C.E. Four distinct languages emerged after that time because of migration and the political organization of the region into four independent and isolated countries.

Balto-Slavic Branch

Balto-Slavic languages predominate in Eastern Europe, as shown in Figure 5-12. Slavic was once a single language, but differences developed in the seventh century C.E., when several groups of Slavs migrated from Asia to different areas of Eastern Europe and thereafter lived in isolation from one another. As a result, this branch has divided into a Baltic group and a Slavic group, which in turn is divided into East, West, and South subgroups. The most widely used Slavic languages are in the East subgroup, primarily Russian, which is spoken by around 80 percent of the Russian people. The importance of Russian increased with the Soviet Union's rise to power. Soviet officials forced native speakers of other languages to learn Russian as a centripetal force to foster cultural unity among the country's diverse peoples.

The most used West Slavic language is Polish, followed by Czech and Slovak. The latter two are quite similar, and most speakers of one can understand the other. The most widely used South Slavic language is the one spoken in Bosnia & Herzegovina, Croatia, Montenegro, and Serbia. When they were all part of Yugoslavia, the language was called Serbo-Croatian. This name now offends Bosniaks and Croatians because it recalls when they were once in a country that was dominated by Serbs. Instead, the names Bosnian, Croatian, and Serbian are preferred by people in these countries to demonstrate that each language is unique, even though linguists consider them one. Bosniaks and Croats write the language in the Latin alphabet, and Serbs use the Cyrillic alphabet.

▲ **FIGURE 5-12 DISTRIBUTION OF THE GERMANIC AND BALTO-SLAVIC BRANCHES OF THE INDO-EUROPEAN LANGUAGE FAMILY**

▲ **FIGURE 5-13 DISTRIBUTION IN EUROPE OF THE ROMANCE BRANCH OF THE INDO-EUROPEAN LANGUAGE FAMILY** The principal language branch of southwestern Europe, the Romance branch, evolved from Latin spoken by the Romans 2,000 years ago. As they conquered much of Europe, Roman armies brought their language with them.

Romance Branch

The four most widely used contemporary languages of the Romance branch are Spanish, Portuguese, French, and Italian (Figure 5-13). The European regions in which these four languages are spoken correspond somewhat to the boundaries of the modern states of Spain, Portugal, France, and Italy. Rugged mountains serve as boundaries among these four countries. The fifth most widely used Romance language, Romanian, is the principal language of Romania and Moldova. It is separated from the other Romance-speaking European countries by Slavic-speaking peoples.

Pause & Reflect 5.1.4 Which branch of Indo-European predominates to the north in Europe, which to the south, and which to the east?

Distribution of Other Language Families

Learning Outcome 5.1.5 Describe the distribution of language families other than Indo-European.

The language forest shows 12 language families with at least 50 million speakers. Users of three of these 12 language families are located primarily in East Asia, and three are located primarily in Southeast Asia.

East Asia Language Families

Most people in East Asia use languages belonging to the Sino-Tibetan language family. The region's two other widely used languages are Japanese and Korean (Figure 5-14).

Sino-Tibetan. Sino-Tibetan is the world's second-most widely used language family. The most commonly used language within the Sino-Tibetan family is Mandarin, which the Chinese call Putonghua ("common speech"). Spoken by approximately three-fourths of the Chinese people, Mandarin is by a wide margin the world's most-used language. Once the language of emperors in Beijing, Mandarin is now the official language of both the People's Republic of China and Taiwan, and it is one of the six official languages of the United Nations. Seven other Sino-Tibetan languages are used by at least 20 million each in China, mostly in the southern and eastern parts of the country: Gan, Hakka, Jinyu, Min Nan, Xiang, Wu, and Yue (also known as Cantonese).

Japanese. Written in part with Chinese characters, Japanese also uses two systems of phonetic symbols, used either in place of Chinese characters or alongside them. Chinese cultural traits have diffused into Japanese society, including the original form of writing Japanese. But the structures of the two languages differ. Foreign terms may be written with one of these sets of phonetic symbols.

Korean. Unlike Sino-Tibetan languages and Japanese, Korean is written in a system known as hankul (also called hangul or onmun). In this system, each letter represents a sound, as in English. More than half the Korean vocabulary derives from Chinese words. In fact, Chinese and Japanese words are the principal sources for creating new Korean words to describe new technology and concepts.

Southeast Asia Language Families

The three mostly widely used language families of Southeast Asia are Austronesian, Austro-Asiatic, and Tai-Kadai.

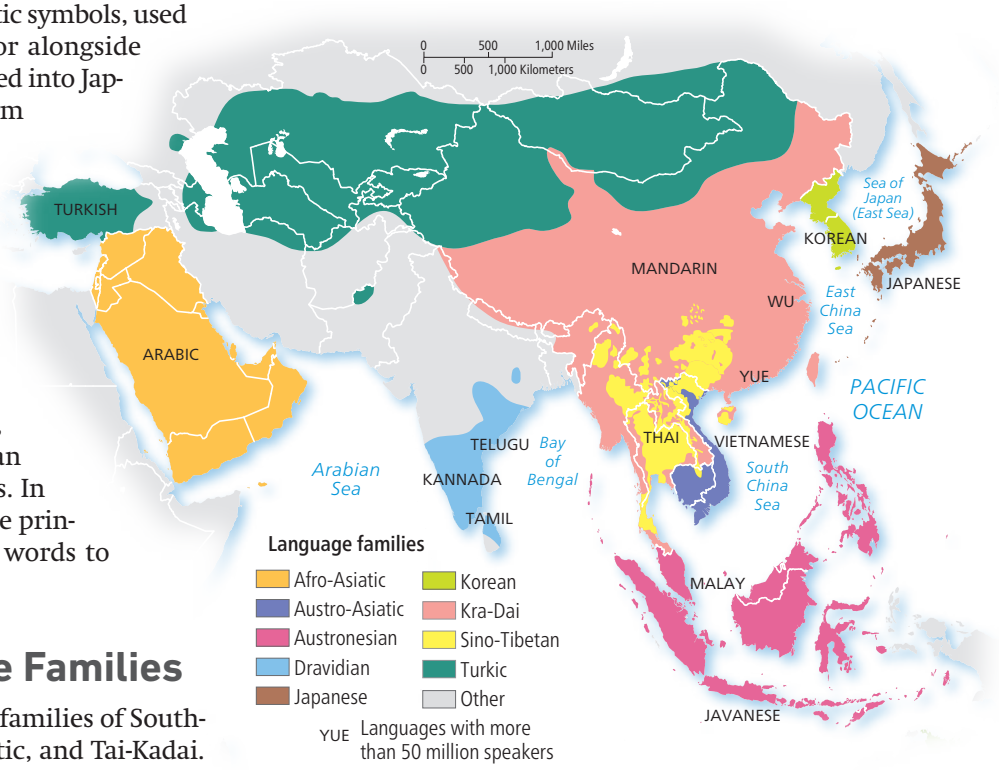
Austronesian. The Austronesian languages are used by about 5 percent of the world's people, who are mostly in Indonesia, which is the world's fourth-most populous country. With its inhabitants dispersed among thousands of islands, Indonesia has many distinct languages and dialects; *Ethnologue* identifies 701 living languages in Indonesia. Indonesia's most widely used first language is Javanese, spoken by 68 million people, mostly on the island of Java, where two-thirds of the country's population is clustered.

Austro-Asiatic. The Austro-Asiatic language family is used by about 2 percent of the world's population. Vietnamese, the most spoken language of the family, is written with our familiar Latin alphabet, with the addition of a large number of diacritical marks above and below the vowels. The Vietnamese alphabet was devised in the seventeenth century by Roman Catholic missionaries.

Tai-Kadai. The Tai-Kadai language family was once classified as a branch of Sino-Tibetan. The principal languages of this family are spoken in Thailand and neighboring portions of China. Similarities with the Austronesian family have led some linguistic scholars to speculate that people speaking these languages may have migrated from the Philippines.

Pause & Reflect 5.1.5 Most language families are named for regions or countries. Based on their names, how would you expect the distributions of the three largest Southeast Asia language families to differ?

FIGURE 5-14 LANGUAGE FAMILIES OF SOUTHWEST, EAST, AND SOUTHEAST ASIA OTHER THAN INDO-EUROPEAN



Other Asian Language Families

Dravidian and Turkic are two other widely used language families in Asia.

Dravidian. The second-most widely used language family in South Asia, following Indo-European, is Dravidian. In southern India, Dravidian is the principal language. The two most widely used languages of the Dravidian language family are Telugu and Tamil. The origin of Dravidian is unknown, and it has been studied less than other widely used language families. When speakers of Indo-European languages reached India, speakers of Dravidian languages were already present.

Turkic. The Turkic language family is thought to have originated in the steppes bordering the Qilian Shan and Altai mountains between Tibet and China. Present distribution covers an 8,000-kilometer (5,000-mile) band of Asia. The Turkic language that has by far the most users is Turkish.

When the Soviet Union governed most of the Turkic-speaking region of Central Asia, use of the Turkic languages was suppressed. With the dissolution of the Soviet Union in the early 1990s, Turkic languages became official in several new countries, including Azerbaijan, Kazakhstan, Kyrgyzstan, Turkmenistan, and Uzbekistan.

The Turkic language family was formerly called "Altaic," but that name is no longer used. The much smaller Uralic language family was once considered closely linked to Turkic, but it is now considered to have originated 7,000 years ago in the Ural Mountains of present-day Russia.

African Language Families

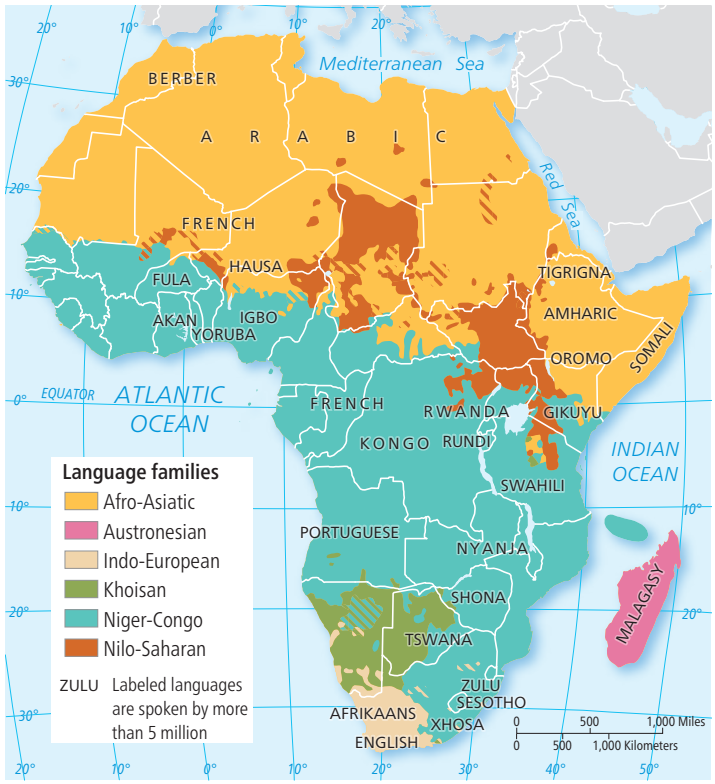
The precise number of languages in Africa is unknown, and scholars disagree on the family in which many of the languages should be classified. In the 1800s, European missionaries and colonial officers recorded African languages using the Latin or Arabic alphabet. *Ethnologue* lists 2,143 languages in Africa; only 199 are institutional. The world's third- and fourth-largest language families are based in Africa: Afro-Asiatic in North Africa and Niger-Congo in sub-Saharan Africa (Figure 5-15).

Afro-Asiatic. Arabic is the major language of the Afro-Asiatic family, an official language in two dozen countries of Southwest Asia & North Africa, and one of six official languages of the United Nations. According to *Ethnologue*, 349 million people speak the official language Arabic. Most also use a second language that is distinct from official Arabic. For example, 70 million people use Egyptian Spoken Arabic. *Ethnologue* identifies 34 distinct Arabic languages in addition to the official one.

A large percentage of the world's 1.9 billion Muslims have at least some knowledge of Arabic because Islam's holiest book, the Quran (Koran), was written in that language in the seventh century. The Afro-Asiatic family also includes Hebrew, the original language of Judaism's Bible (Tanakh) and Christianity's Old Testament.

Niger–Congo. More than 95 percent of the people in sub-Saharan Africa use languages of the Niger-Congo language family. The three most widely spoken Niger-Congo languages are Yoruba, Igbo, and Swahili. Yoruba and Igbo are among the many languages of Nigeria. Swahili is an official language in Kenya, Rwanda, Tanzania, and Uganda. It is the first language of 16 million people and is spoken as a second language by more than 50 million Africans. Especially in rural areas, the local language is used to communicate with others from the same village, and Swahili is used to communicate with outsiders. Swahili originally developed through interaction among African groups and Arab traders, so its vocabulary has strong Arabic influences. It is one of the few African languages with an extensive literature.

Nilo-Saharan. Languages of the Nilo-Saharan language family are used by 53 million people in north-central Africa, immediately north of the Niger-Congo language family region. Divisions within the Nilo-Saharan language family exemplify the problem of classifying African languages. Despite having relatively few speakers, the Nilo-Saharan language family is divided into six branches plus numerous groups and subgroups. The total number of speakers of each individual Nilo-Saharan language is extremely small.



▲ **FIGURE 5-15 AFRICAN LANGUAGES** The great number of languages results from at least 5,000 years of minimal interaction among the thousands of cultural groups inhabiting the African continent.

KEY ISSUE

5.2 | Why Do Languages Diffuse?

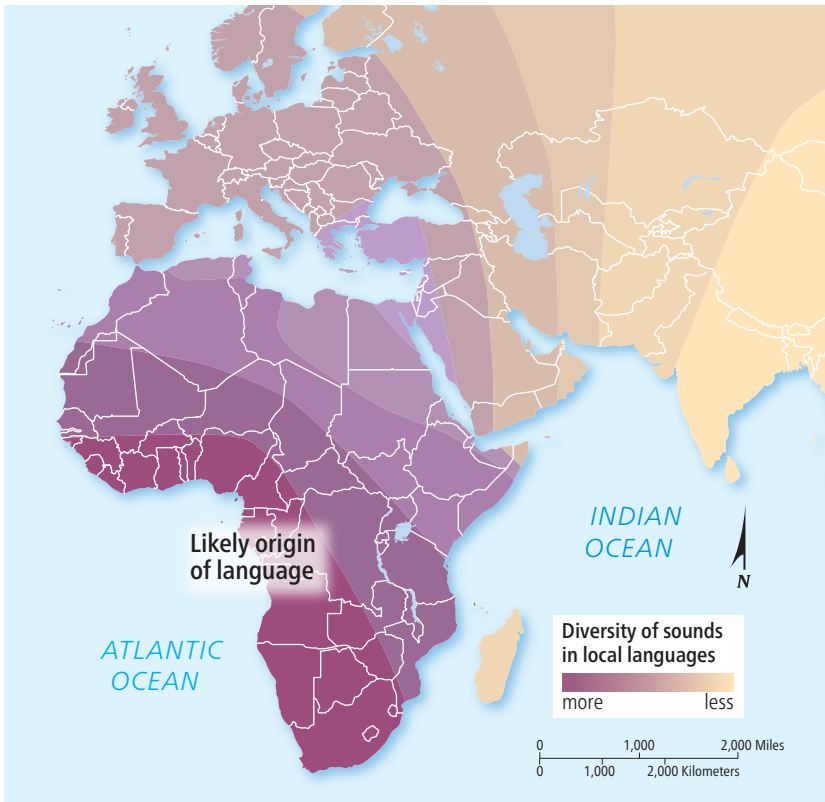
Like other cultural elements, the contemporary distribution of languages exists because of geographic processes of origin and diffusion. The origin and diffusion of contemporary language branches and individual languages can be documented because these processes have occurred since recorded history began. However, determining the roots of a contemporary language—its language family—is speculative at best.

Possible Origin of Languages

Learning Outcome 5.2.1 Explain processes of origin and diffusion of a language family.

The emergence of distinct language families predates recorded history, so we can only speculate about their origin and initial diffusion. A biologist in New Zealand, Quentin Atkinson, argues that language originated in Africa. He argues that languages first diffused eastward across Africa before crossing into Asia and Europe (Figure 5-16).

According to Atkinson, languages are most complex and diverse in Africa. Atkinson thinks humans outside Africa display less linguistic diversity because their languages have had a shorter time in which to evolve into new languages than have African languages.

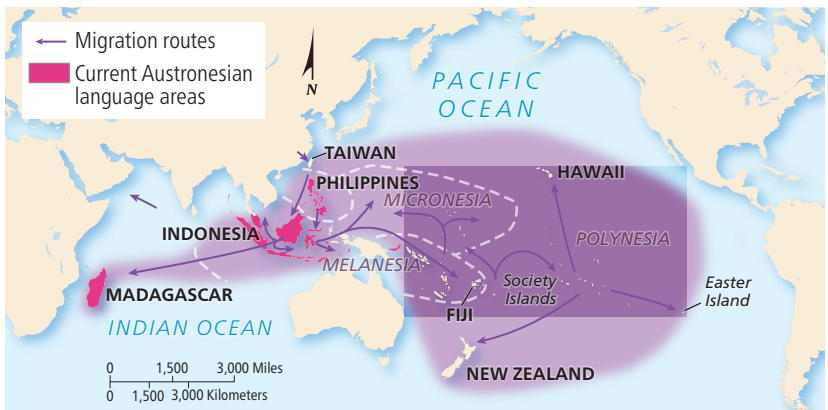


▲ **FIGURE 5-16 POSSIBLE ORIGIN OF LANGUAGES** Biologist Quentin Atkinson argues that languages originated in West Africa hundreds of thousands of years ago. Further from that region of origin, languages are less diverse with fewer phonetic sounds.

Early Diffusion of a Language

Refer back to the distribution of the Austronesian language family on the map of distribution of language families (Figure 5-9). Most users of Austronesian languages live in Southeast Asia, especially in Indonesia. However, note that an Austronesian language is shown for Madagascar, the large island off the east coast of Africa. Malagasy, the principal language of Madagascar, can be seen on the Austronesian "tree" in Figure 5-7.

That the people of Madagascar use a language belonging to the same language family as the languages of most of Indonesia and the Philippines is strong evidence of migration a long time ago between these two places. Researchers have concluded that migrants sailed the 6,000 kilometers (4,000 miles) across the Indian Ocean from the Sunda Islands of present-day Indonesia (probably from Borneo or Java) to Madagascar approximately 1,500 years ago. Through migration, Austronesian languages also diffused the same language family south to New Zealand and east across the Pacific to Polynesia and eventually reaching Hawaii (Figure 5-17). We don't know what their boats were like or why they migrated.



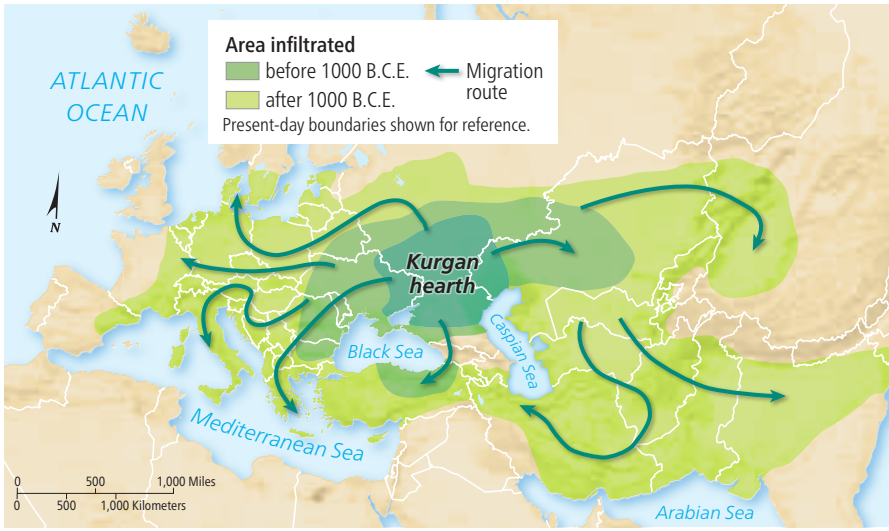
▲ **FIGURE 5-17 ANCIENT MIGRATION OF A LANGUAGE FAMILY** The current distribution of the Austronesian language family is a function of migration of Austronesian people beginning around 2,000 years ago.

Common Ancestry of Indo-European Languages

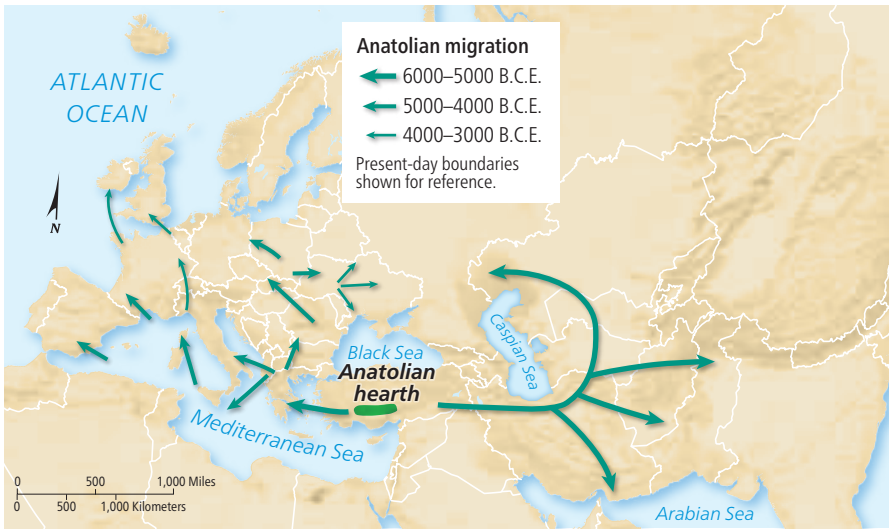
If Germanic, Romance, Balto-Slavic, and Indo-Iranian languages are all part of the same Indo-European language family, then it is reasonable to assume they are descended from a single common ancestral language. The existence of a single ancestor language – which can be called Proto-Indo-European – cannot be proved with certainty because it would have existed thousands of years before the invention of writing or recorded history.

Since the origin of language families predates recorded history, the evidence that the Indo-European language family originated with a single Proto-Indo-European language comes primarily from words related to the physical environment. For example, individual Indo-European languages share words for some animals and trees (such as *beech*, *oak*, *bear*, *deer*, *pheasant*, and *bee*), but other words are unshared (such as *elephant*, *camel*, *rice*, and *bamboo*). Therefore, linguists conclude that original Proto-Indo-European speakers lived in a place where the shared animals and trees are found, whereas the unshared words were added later, after the original language split into branches.

Based on words shared by Indo-European languages, linguists conclude that the original Proto-Indo-European speakers probably lived in a cold climate or one that had a winter season. Based on words unshared by Indo-European languages, linguists believe the Proto-Indo-European speakers did not come in contact with oceans.



▲ **FIGURE 5-18 ORIGIN AND DIFFUSION OF INDO-EUROPEAN: NOMADIC WARRIOR THEORY**



▲ **FIGURE 5-19 ORIGIN AND DIFFUSION OF INDO-EUROPEAN: SEDENTARY FARMER THEORY**

Nomadic Warrior Theory. Linguists and anthropologists disagree on when and where Proto-Indo-European speakers originated and the process and routes by which they diffused. Two theories are the "nomadic warrior" and the "sedentary farmer."

The first Proto-Indo-European speakers were the Kurgan people, according to archaeologist Marija Gimbutas. The earliest archaeological evidence of the Kurgans dates to around 4300 B.C.E., near the border between present-day Russia and Kazakhstan.

Among the first people to domesticate horses and use chariots, the Kurgans migrated in search of grasslands for their animals. This took them westward through Europe, eastward to Siberia, and southeastward to Iran and South Asia. Between 3500 and 2500 B.C.E., Kurgan warriors, having established military superiority with their horse-drawn chariots, conquered much of Europe and South Asia (Figure 5-18).

Sedentary Farmer Theory. Archaeologist Colin Renfrew argues that the first speakers of Proto-Indo-European lived 2,000 years before the Kurgans, in Anatolia, a peninsula in Western Asia that constitutes most of present-day Türkiye (Figure 5-19). Supporting Renfrew, biologist Russell D. Gray dates the first speakers even earlier, at around 6700 B.C.E. This hypothesis argues that Indo-European diffused into Europe and South Asia from the Anatolian hearth along with agricultural practices rather than by military conquest. The language triumphed because its speakers became more numerous and prosperous by growing their own food instead of relying on hunting.

The diffusion of Indo-European speakers points to a fundamental question for humanity: Do cultural elements such as language diffuse primarily through warfare and conquest or primarily through peaceful sharing of resources? Regardless of how Indo-European speakers diffused, communication was poor among different peoples, whether warriors or farmers. After many generations of complete isolation, individual groups evolved increasingly distinct languages.

Pause & Reflect 5.2.1 Pick an English word for an animal or plant. Use a translation app to see the word in French or Spanish. Does the word look similar or very different? Why?

Origin & Diffusion of English

Learning Outcome 5.2.2 Analyze processes underlying current distribution of English.

The British Isles have been inhabited for thousands of years, but we know nothing of the early languages spoken there until tribes called the Celts arrived around 2000 B.C.E., speaking languages we call Celtic. Around 450 C.E., tribes from mainland Europe invaded, pushing the Celts into the remote northern and western parts of Britain.

Origin of English

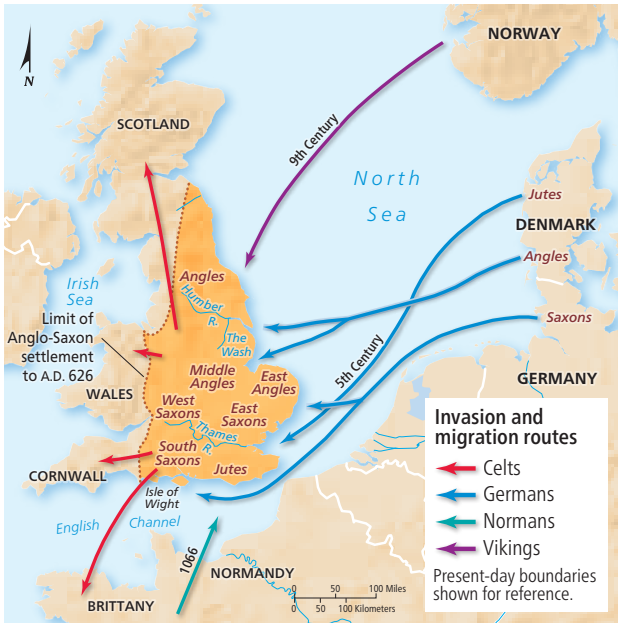
English is the language of England because of migration from various parts of Europe, including Angles, Saxons, and Jutes from northern Germany and southern Denmark around 450 C.E.; Vikings from present-day Norway between 793 and 1066; and Normans from present-day Normandy in France in 1066 (Figure 5-20).

After the Norman invasion in 1066, French became the official language of England. The French used by the leaders and the Germanic languages used by the common people mingled to form a new language, English, which became the country's official language in 1362. Modern English is a mix of Romance and Germanic words (Figure 5-21). It owes its simpler straightforward words, such as *sky* and *horse*, to its Germanic invaders, and more elegant words, such as celestial and equestrian, to its French invaders.

Diffusion of English

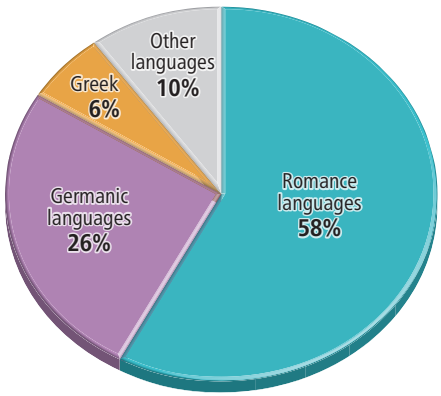
English is an official language in 55 countries, more than any other language (Figure 5-22). English is not an official language in other countries where English predominates, including the United States, the United Kingdom, Australia, and New Zealand. The contemporary distribution of English speakers around the world exists because the people of England migrated with their language when they established colonies over the course of four centuries.

English first diffused west from England to North America in the seventeenth century. After England defeated France in a battle to dominate the North American colonies during the eighteenth century, the position of English as the principal language of North America was assured. Similarly, the British took control of Ireland in the seventeenth century, South Asia in the mid-eighteenth century, the South Pacific in the late eighteenth and early nineteenth centuries, and southern and eastern Africa in the late nineteenth century. In each case, English became an official language, even if only the colonial rulers and a handful of elite local residents could speak it.

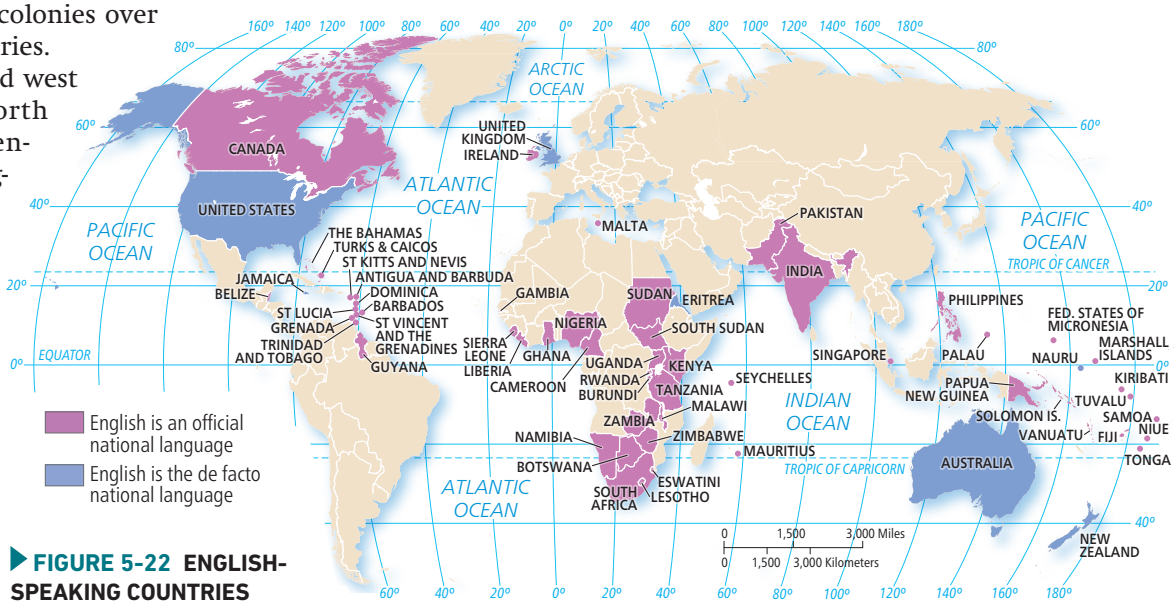


▲ **FIGURE 5-20 INVASIONS OF ENGLAND**

▼ **FIGURE 5-21 ORIGIN OF ENGLISH WORDS**



Pause & Reflect 5.2.2 Consider the words *school* and *university*: Which of those words entered the English language through the German invasions, and which through the Norman invasion?



▶ **FIGURE 5-22 ENGLISH-SPEAKING COUNTRIES**

Lingua Franca

One of the most fundamental needs in a global society is a common language for communication. In the modern world, the most important language of international communication is English. A Polish airline pilot who flies over Spain speaks to the traffic controller on the ground in English. Swiss bankers speak German among themselves, but with German bankers, they prefer to speak English. English is the language spoken at an aircraft factory in France and an appliance company in Italy.

A language of international communication, such as English, is known as a **lingua franca**. To facilitate trade, speakers of two different languages agree to use a language known to both as a lingua franca. The term, which means "language of the Franks," was originally applied by Arab traders during the Middle Ages to the language they used to communicate with Europeans, whom they called Franks.

Other than English, modern lingua franca languages include Swahili in East Africa (Figure 5-23), Hindi in South Asia, Indonesian (a variation of Malay) in Southeast Asia, and Russian in the former Soviet Union. A number of African countries that became independent in the twentieth century adopted English or Swahili as an official language for government business, as well as for commerce, even if the majority of the people couldn't speak it.

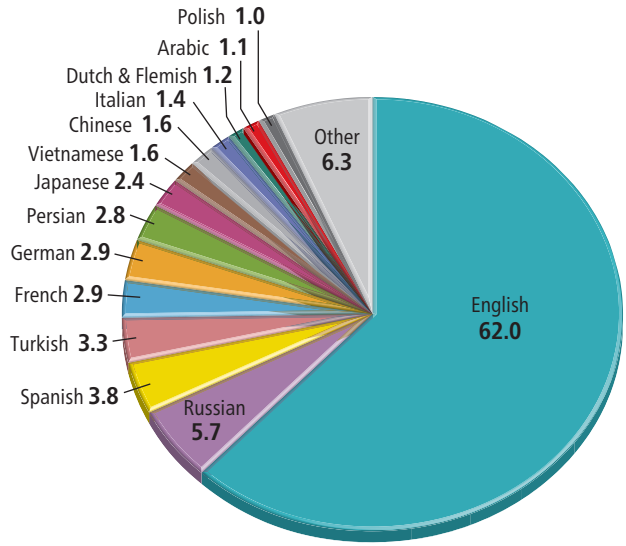
A **pidgin language** is a simplified form of a lingua franca. To communicate with speakers of another language, two groups construct a pidgin language by learning a few elements of the lingua franca.

▲ **FIGURE 5-23 LINGUA FRANCA, TANZANIA** High-voltage sign in (top to bottom) English, Arabic, Swahili, and Hindi.

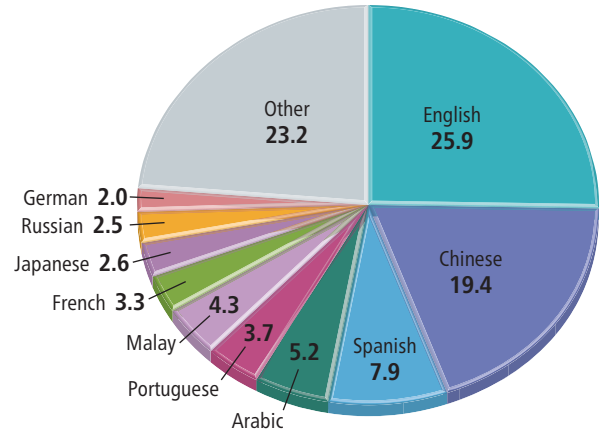
English on the Internet

The emergence of the internet as an important means of communication has further strengthened the dominance of English. Nearly two-thirds of all internet content is in English (Figure 5-24), even though only around one-fourth of internet users are English speakers (Figure 5-25). Given the large percentage of internet content in English, knowledge of English is essential for internet users around the world.

English may be less dominant as the language of the internet in the years ahead. Future leadership in social media may pass to China, in part because of the large number of people worldwide who speak Chinese languages. The attraction of Chinese languages also comes from being written primarily with logograms. Chinese is an attractive language to use in social media that restrict the number of characters, such as Twitter. An English message that uses the maximum 280 symbols permitted by Twitter could be written in logograms in only around 140 characters.



▲ **FIGURE 5-24 LANGUAGES OF WEBSITES** Figures are percent of all websites. The share of all websites in English has been increasing.



▲ **FIGURE 5-25 LANGUAGES OF INTERNET USERS** Figures are percent of all speakers.

KEY ISSUE

5.3 | Why Do Languages Vary Among Places?

A language may be spoken or written in a variety of distinctive ways. With its global diffusion, English has an especially large number of variations.

Dialects

Learning Outcome 5.3.1 Analyze the ways that dialects vary.

A **dialect** is a regional variation of a language distinguished by distinctive vocabulary, spelling, and pronunciation. Generally, speakers of one dialect can understand speakers of another dialect. A **subdialect** is a subdivision of a dialect. Two subdialects of the same dialect share relatively few differences, primarily in pronunciation and a small amount of vocabulary.

American and British English

When speakers of a language migrate to other locations, various dialects of that language may develop. This was the case with the migration of English speakers to North America several hundred years ago. North Americans are well aware that they speak English differently from the British, not to mention people living in India, Pakistan, Australia, and other English-speaking countries. U.S. English differs from the English of England in three significant ways – vocabulary, spelling, and pronunciation.

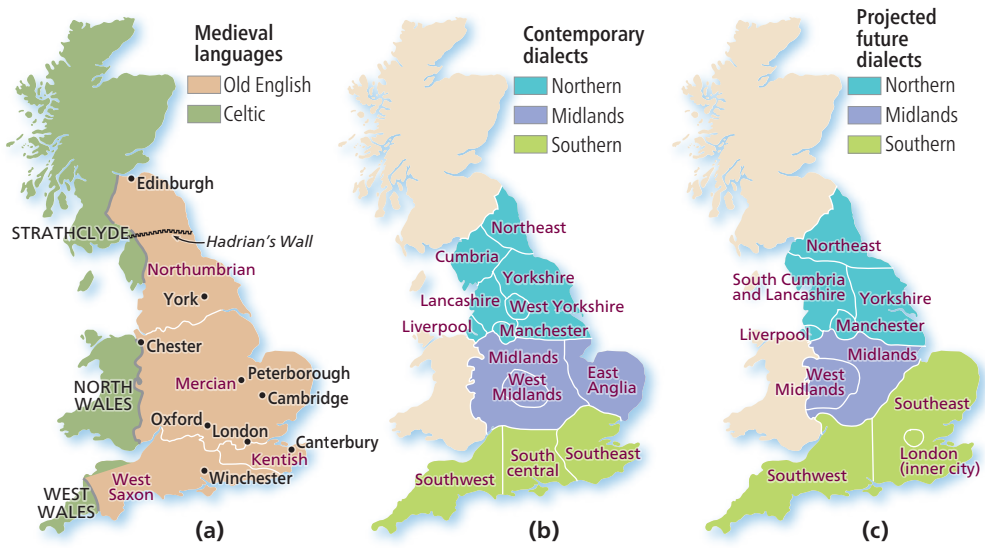
Vocabulary. The vocabulary of U.S. English differs from the English of England largely because settlers in America encountered many new objects and experiences. The new continent contained physical features, such as large forests and mountains, that had to be given new names. Indigenous Native Americans also enriched American English with names for objects such as canoe, moccasin, and squash and animals such as moose, raccoon, and chipmunk. As new inventions appeared in the world, they acquired different names on either side of the Atlantic. For example, the British call the hood of a car "the bonnet" and the trunk "the boot."

Pronunciation. From the time of their arrival in North America, colonists began to pronounce words differently from the British. Such divergence is normal, for interaction between the two groups was largely confined to exchange of letters and other printed matter rather than direct speech.

Spelling. American spelling diverged from the British standard because of a strong feeling in the United States for an independent identity. Noah Webster, the creator of the first comprehensive American dictionary and grammar books, was determined to develop a uniquely American dialect of English. He either ignored or was unaware of recently created rules of grammar and spelling developed in England. Webster argued that spelling and grammar reforms would help establish a national language, reduce cultural dependence on England, and inspire national pride.

Dialects in the United Kingdom

English varies by regions within individual countries. In England, dialects can be traced back to the invading groups from Northern Europe who settled in different parts of the country (Figure 5-26). The boundaries between English dialects have been moving (Figure 5-26c). The changes reflect patterns of migration, especially of Londoners moving out. In a language with multiple dialects, one dialect may be recognized as the **standard language**, which is a dialect widely recognized as the most acceptable for government, business, education, and mass communications like TV. In the case of England, the standard language is known as **Received Pronunciation (RP)**. It is well known around the world as the dialect commonly used by politicians, broadcasters, and actors.



▲ **FIGURE 5-26 DIALECTS IN THE UNITED KINGDOM** The Southeast dialect based in London is forecast to expand because of migration of Londoners.

U.S. Dialects

The United States has four major dialect regions: North, Midland, South, and West (Figure 5-27). Three of those dialect regions – North, Midland, and South – can be divided into several subdialects. As with other elements of language, the distribution of U.S. dialects is a function of migration.

The distribution of dialects is documented through the study of particular words. Every word that is not used nationally has some geographic extent within the country and therefore has boundaries. Such a word-usage boundary, known as an **isogloss**, can be constructed for each word. Although every word has a unique isogloss, boundary lines of different words coalesce in some locations to form regions.

The current distribution of U.S. dialects can be traced to differences in the origin of the English colonists along the East Coast. Three distinct dialect regions development in the early colonies – North, South, and Midland.

- **North.** Two-thirds of the New England colonists were Puritans from East Anglia in southeastern England, and only a few came from the north of England. The characteristic dropping of the /r/ sound at the end of words in the North dialect of the United States is shared with speakers from the south of England.
- **South.** About half of the early U.S. immigrants who settled in the South came from southeastern England, including deported prisoners, indentured servants, and political and religious refugees.
- **Midland.** Early immigrants to the U.S. Midland region were more diverse. The settlers of Pennsylvania were predominantly Quakers from the north of England. Scots and Irish also went to Pennsylvania as well as to New Jersey and Delaware. The Middle Atlantic colonies also attracted many German, Dutch, and Swedish immigrants.

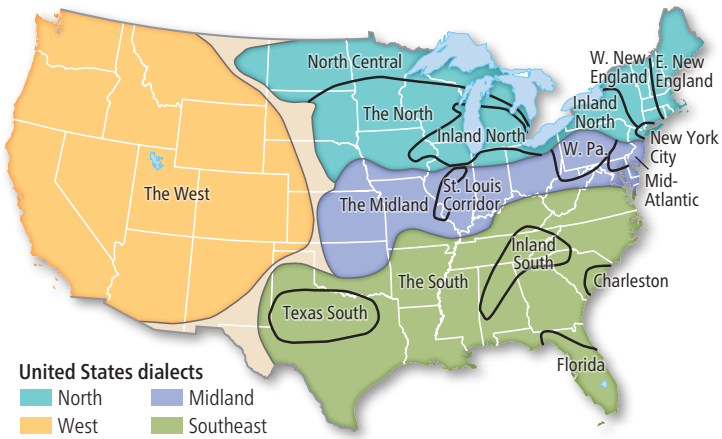
The diffusion of particular English dialects across the United States is a result of the westward movement of colonists from the East Coast. The North and South accents sound unusual to the majority of Americans because the standard pronunciation throughout the American West comes from the Midland rather than the North and South regions. The emergence of the distinct West accent and pronunciation occurred because of a strong history with a single dialect – most western settlers came from the Midland.

Regional dialect differences persist in the United States. For example, to describe a soft drink, most people in the Northeast and Southwest as well as the St. Louis area use *soda*. Most people in the Midwest, Great Plains, and Northwest prefer *pop*. Southerners refer to all soft drinks as *Coke* (Figure 5-28).

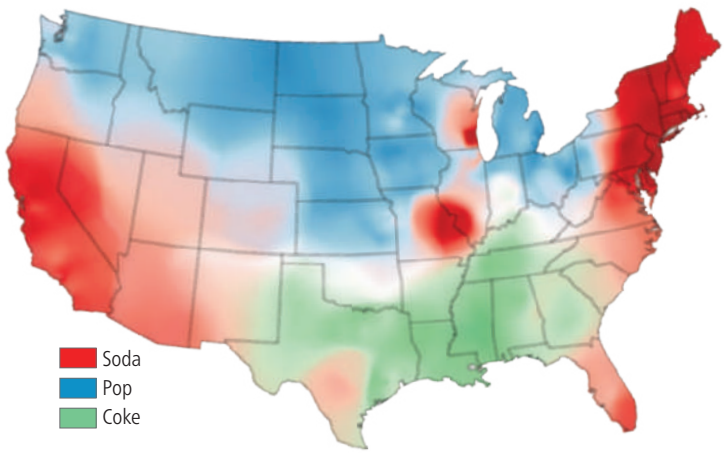
Appalachian & Black English

Natives of Appalachian communities, such as in rural West Virginia, have a distinctive dialect, pronouncing *hollow* as "holler" and *creek* as "crick," for example. Distinctive grammatical practices include the use of the double negative, such as "ain't nothing," and adding "a" in front of verbs ending in "-ing," such as "a-sitting." Some Appalachian residents are "bidialectic": They speak "standard" English outside Appalachia and their regional dialect at home.

Some Black Americans speak a dialect of English heavily influenced by the group's distinctive heritage of forced migration from Africa during the eighteenth century for enslavement in the southern colonies. Black American dialect words such as *gumbo* and *jazz* have long since diffused into the standard English language. That dialect has been termed **African American Vernacular English (AAVE)**.



▲ **FIGURE 5-27 ISOLGLOSSES OF U.S. DIALECTS AND SUBDIALECTS** The most comprehensive classification of dialects in the United States was made by Hans Kurath in 1949.



▲ **FIGURE 5-28 U.S. SOFT-DRINK DIALECTS** Soft drinks are called *soda* in the Northeast and Southwest, *pop* in the Midwest and Northwest, and *Coke* in the South. The map reflects voting at popvssoda.com.

Pause & Reflect 5.3.1 Does your English fall into one of these dialects? Why or why not?

Sharing Languages

Learning Outcome 5.3.2 Examine examples of diversity of languages.

The world's seven-thousand-plus languages include a wide diversity of informal languages. They also differ in the way they distinguish between masculine and feminine.

Language Diversity

Multiple languages coexist in some countries (Figure 5-29). Two countries in Southeast Asia – Papua New Guinea and Indonesia – together are home to users of more than 20 percent of all of the world's languages. In Papua New Guinea, an island country with only 9 million inhabitants, the median number of speakers of each language is only 1,315 people, according to *Ethnologue* (Figure 5-30).

Gender Differences in Languages

Languages vary in their ability to absorb and to reflect a cultural change, such as gender equality. Languages vary by gender in two principal ways:

- The grammar of the language may distinguish between masculine and feminine.
- Men and women use different words and converse differently.

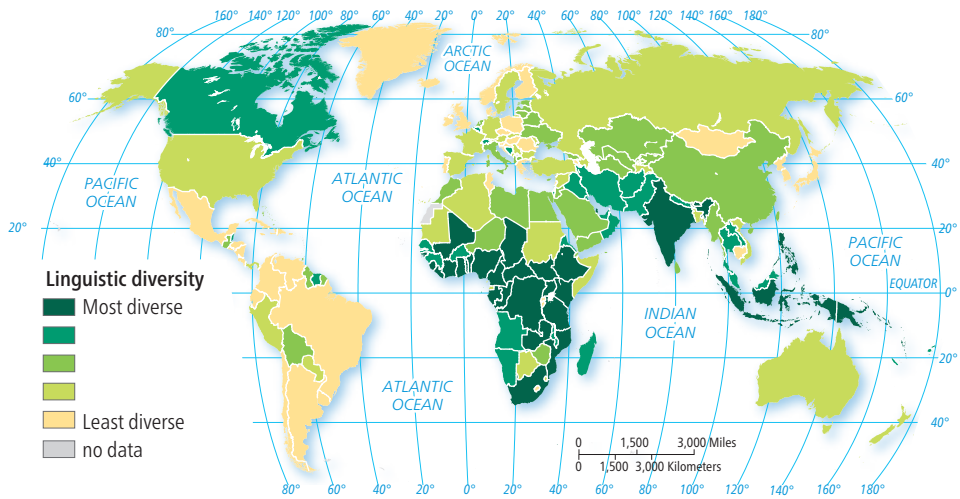
Languages are divided about evenly between those that distinguish between masculine and feminine and those that do not. Of the 20 most widely used languages, 12 make gender distinctions, and 8 do not. Nouns and verbs may carry distinctive forms or endings depending on gender, such as adding "ova" to designate feminine names in Russian. Others use distinctive articles, such as the French "la" in front of a feminine noun and "le" in front of a masculine one.

Austronesian, Turkic, and Uralic are considered genderless language families. All the widely spoken languages in the Indo-European family other than English distinguish between masculine and feminine nouns and verbs. The gender-specific exception in English is singular pronouns (*he/she* and *his/hers*). Careful construction of sentences can avoid the handful of gender-specific pronouns in English, but gender neutrality is not possible in many other languages.

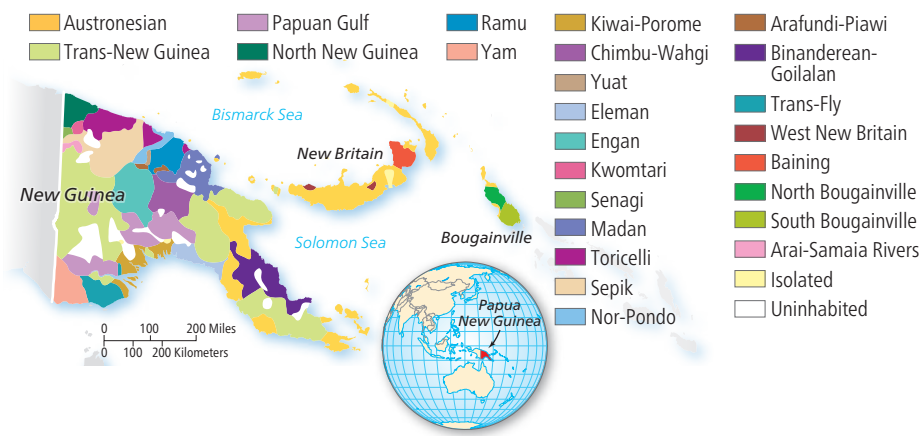
Though the English language is largely gender neutral, men and women have been found to speak the language differently. An analysis of around 10 million messages written by more than 52,000 consenting Facebook users found that women used language that was warmer than language used by men. Women mentioned friends, family, and social life more often, whereas men swore more, used angrier and more argumentative language, and discussed objects more than people. On average, women used language that was characteristic of compassion and politeness, whereas men's language was more hostile and impersonal.

In a paper titled "Women Are Warmer but No Less Assertive Than Men: Gender and Language on Facebook," a team of psychologists and computer scientists from Stony Brook University, the University of Pennsylvania, and the University of Melbourne in Australia were able to predict the gender of the Facebook writer 90 percent of the time. Women were more likely to use such words as *wonderful*, *happy*, *birthday*, *daughter*, *baby*, *excited*, and *thankful*. Words more likely to be used by men included *freedom*, *liberty*, *win*, *lose*, *battle*, and *enemy*.

Pause & Reflect 5.3.2 Based on the possible origin of languages, why might sub-Saharan Africa appear to have relatively high linguistic diversity (as Figure 5-29 illustrates)?



▲ **FIGURE 5-29 NUMBER OF LANGUAGES PER COUNTRY**

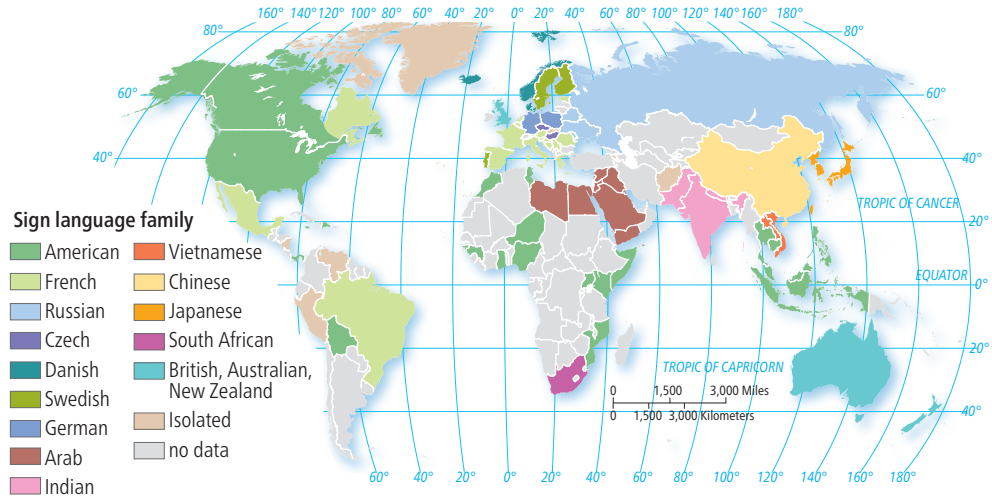


▲ **FIGURE 5-30 LANGUAGE FAMILIES IN PAPUA NEW GUINEA**

Sign Languages

Sign languages are full-fledged natural languages with their own grammar and lexicon (Figure 5-31). Sign languages are not universal, and they are not mutually intelligible with each other. *Ethnologue* lists 157 sign languages, and other sources have higher totals.

American Sign Language (ASL) is thought to have originated at the American School for the Deaf, founded in Hartford, Connecticut, in 1817 by Thomas Gallaudet. The sign language that Gallaudet adopted was based on methods that he had observed in France. As a result, ASL shares around 80 percent of its sign language movements with those used in France. Around a half-million Americans are estimated to use ASL.



▲ **FIGURE 5-31 SIGN LANGUAGE FAMILIES**

Creole Languages

A **creole**, or **creolized language,** is a language that forms over time from the mixing of a colonizer's language with the indigenous language of the people being dominated. A creolized language forms when the colonized group adopts the language of the dominant group but makes some changes, such as simplifying the grammar and adding words from the former language. Examples include French Creole in Haiti, Papiamento (creolized Spanish) in Netherlands Antilles (West Indies), and Portuguese Creole in the Cape Verde Islands off the African coast. These creole languages spoken in former colonies are classified as separate languages because they differ substantially from the original introduced by European colonizers (Figure 5-32). The use of a creole language is a way to maintain cultural identity and unity among formerly colonized people.

Informal Languages

Informal languages are being created through combining English with other languages. Examples include Franglais, Spanglish, and Denglish.

▼ **FIGURE 5-32 SIGN IN ENGLISH, SPANISH, AND CREOLE** Miami, Florida.

Franglais is the mix of French and English (Figure 5-33). French is an official language in 29 countries and for hundreds of years served as the most important lingua franca for international diplomats. Traditionally, language has been an especially important source of national pride and identity in France. For this reason, the French government officially encourages the use of terms that are purely French rather than terms that borrow from English.

Spanglish is the mix of Spanish and English. English is diffusing into the Spanish language spoken by 40 million Hispanic Americans. New words have been invented in Spanglish that do not exist in English but would be useful if they did. For example, *textear* ("texting") is a verb derived from the English and is less awkward than the Spanish phrase "mandar un mensajito" ("send a short message").

Denglish is the mix of German and English. The *D* stands for *Deutsch*, the German word for German. For example, the German telephone company Deutsche Telekom uses the German word *Deutschlandverbindungen* for "long distance" and the Denglish word *Cityverbindungen* for "local" (rather than the German word *Ortsverbindungen*).

▼ **FIGURE 5-33 FRANGLAIS** The name of this café in Nantes, France, is a mix of English (*death*), French (*porc*), and a word shared by both languages (*cafe*).

Dialect or Language?

Learning Outcome 5.3.3 Summarize challenges in distinguishing between some dialects and languages.

Distinguishing between dialects and distinct languages is a good example of global–local tensions. Migration, increased interaction, and other globalization processes have resulted in strengthening of standard languages and suppression of dialects. On the other hand, desire for more local cultural identity has resulted in the emergence of distinct languages that were once considered dialects.

Dialects Become Languages

It is sometimes difficult to distinguish between a language and a dialect. Many linguists consider mutual intelligibility to be the most important characteristic that distinguishes two different languages from two dialects of a single language. **Mutual intelligibility** refers to the ability of people speaking in two ways to readily understand each other without prior familiarity or special effort. In principle, two dialects of a language are mutually intelligible, whereas two different languages are not. However, in reality, two distinct languages are actually sometimes intelligible; examples include Czech and Slovak and Afrikaans and Dutch. The Romance branch offers several examples of the challenges in distinguishing between dialect and language.

Italy's Languages. Several languages in Italy that have been traditionally considered dialects of Italian are now viewed by *Ethnologue* as sufficiently different to merit classification as languages distinct from Italian. These include (with the number of speakers in parentheses) Venetian (7.9 million), Napoletano-Calebrese (5.7 million), Sicilian (4.7 million), and Lombard (3.9 million). These languages do not have official national status but are recognized by regional governments within Italy. See Figure 5-13 for the distribution of these languages within Italy.

Occitan. Occitan is spoken by about 2 million people in southern France and adjacent countries. The name derives from the French region of Aquitaine, which in French has a similar pronunciation to Occitan. The French government has established bilingual elementary and high schools called *calandretas* in the Occitan region. These schools teach both French and Occitan, according to a curriculum established by the Ministry of Higher Education, Research, and Innovation. Still, many people living in southern France want to see more efforts by the government of France to encourage the use of Occitan.

▼ **FIGURE 5-34 CATALÁN** Protest sign in Catalonian and flag of Catalonia, Barcelona.

Moldovan. The Republic of Moldova's official language is Romanian. After the country's independence in 1991, the government changed the name of the language to Moldovan, and most respondents to the country's census call their language Moldovan. However, Moldova's highest court ruled in 2013 that the official name must be Romanian because that is the way it was written in the country's 1991 Declaration of Independence.

Catalán-Valencian-Balear. Catalán was once regarded as a dialect of Spanish, but linguists now agree that it is a separate Romance language (Figure 5-34). Like other Romance languages, Catalán can be traced to Vulgar Latin, and it developed as a separate language after the collapse of the Roman Empire.

Catalán is the official language of Andorra, a tiny country of 77,000 inhabitants situated in the Pyrenees Mountains between Spain and France. Catalán is also spoken by 4 million people in eastern Spain and is the official language of Spain's highly autonomous Catalonia province, centered on the city of Barcelona.

With the status of Catalán settled as a separate language, linguists are identifying its principal dialects. Linguists agree that Balear is a dialect of Catalán that is spoken in the Balearic Islands, which include Ibiza and Majorca.

More controversial is the status of Valencian, which is spoken mostly in and around the city of Valencia. Most linguists consider Valencian a dialect of Catalán. However, many in Valencia, including the Valencian Academy of the Language, consider Valencian a separate language because it contains words derived from people who lived in the region before the Roman conquest. *Ethnologue* now calls the language Catalán-Valencian-Balear.

Galician. Whether Galician, which is spoken in northwestern Spain and northeastern Portugal, is a dialect of Portuguese or a distinct language is debated among speakers of Galician. The Royal Galician Academy considers it a separate language and a symbol of cultural independence. Galician is recognized as an official language of Spain's Galicia region of Spain.

The Galician Academy of the Portuguese Language prefers to consider it a dialect because as a separate language, it would be relegated to a minor and obscure status, whereas as a dialect of Portuguese, it can help influence one of the world's most widely used languages.

Pause & Reflect 5.3.3 Use a translation app online to see what the sign says in Figure 5-34.

Standardizing Languages

Governments have long promoted the designation of a single dialect as the official or standard language in order to promote cultural unity. Here are several examples of such designations in the Romance language branch.

French. The standard form of French derives from Francien, which was once a dialect of the Île-de-France region of the country. Francien became the standard form of French because the region included Paris, which became the capital and largest city of France. Francien French became the country's official language in the sixteenth century, and local dialects tended to disappear as a result of the capital's longtime dominance over French political, economic, and social life.

Spanish. The Portuguese and Spanish languages spoken in the Western Hemisphere differ from their European versions, as is the case with U.S. and British English. To unify Spanish, the members of the Royal Spanish Academy meet every week in a mansion in Madrid to clarify rules for the vocabulary, spelling, and pronunciation of the Spanish language around the world. The academy's official dictionary, published in 1992, has added hundreds of "Spanish" words that originated in either the regional dialects of Spain or the indigenous languages of Latin America.

Portuguese. To unify Portuguese, Brazil, Portugal, and several Portuguese-speaking countries in Africa agreed in 1994 to standardize the way their common language is written. Many people in Portugal are upset that the new standard language more closely resembles the Brazilian version. For example, the standardized version eliminates some of the accent marks—such as tildes (as in São Paulo), cedillas (as in Alcobaça), circumflexes (as in Estância), and hyphens. In addition, the agreement recognizes as standard thousands of words that Brazilians have added to the language, such as words for flowers, animals, and other features of the natural environment found in Brazil but not in Portugal.

The standardization of Spanish and Portuguese is a reflection of the level of interaction that is possible in the modern world between groups of people who live tens of thousands of kilometers apart. Books and television programs produced in one country diffuse rapidly to other countries where the same language is used.

Official Languages

An **official language** is used by the government to enact legislation, publish documents, and conduct other public business. In some cases, the official language is the only one that is used in public school. A **working language** is designated by an international organization or corporation as its primary means of communication for daily correspondence and conversation. The United Nations has six official and working languages: Arabic, Chinese, English, French, Russian, and Spanish.

Europe has a large number of official languages (Figure 5-35). The European Union recognizes 24 official and working languages: Bulgarian, Croatian, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Irish, Italian, Latvian, Lithuanian, Maltese, Polish, Portuguese, Romanian, Slovak, Slovene, Spanish, and Swedish.

▲ **FIGURE 5-35 EUROPE'S OFFICIAL LANGUAGES**

Multilingual Places

Learning Outcome 5.3.4 Give examples of countries that embrace more than one language.

Multiple languages coexist in some countries, with varying degrees of success. In some countries, distinct cultural groups speaking different languages may occupy separate regions. In other countries, speakers of various languages intermingle. Some countries have devised strategies to promote language as a centripetal force through peaceful coexistence among speakers of different languages. Other countries face challenges among cultural groups speaking more than one language, a condition threatening to act as a centrifugal force.

Switzerland: Institutionalized Diversity

The boundary between the Romance and Germanic branches of Indo-European runs through the middle of two small European countries, Belgium and Switzerland. Belgium has had more difficulty than Switzerland in reconciling the interests of the different language speakers.

Switzerland has four official languages: German (used by 62 percent of the population), French (23 percent), Italian (8 percent), and Rumantsch (1 percent). These four languages predominate in different parts of the country (Figure 5-36). Swiss voters made Rumantsch (sometimes spelled Romansh in English) an official language in a 1938 referendum despite the small percentage of people who use the language.

Switzerland peacefully exists with multiple languages. The Swiss, relatively tolerant of citizens who speak other languages, have institutionalized cultural diversity by creating a form of government that places considerable power in small communities. The key is a long tradition of decentralized government in which local authorities hold most of the power and decisions are frequently made by voter referenda.

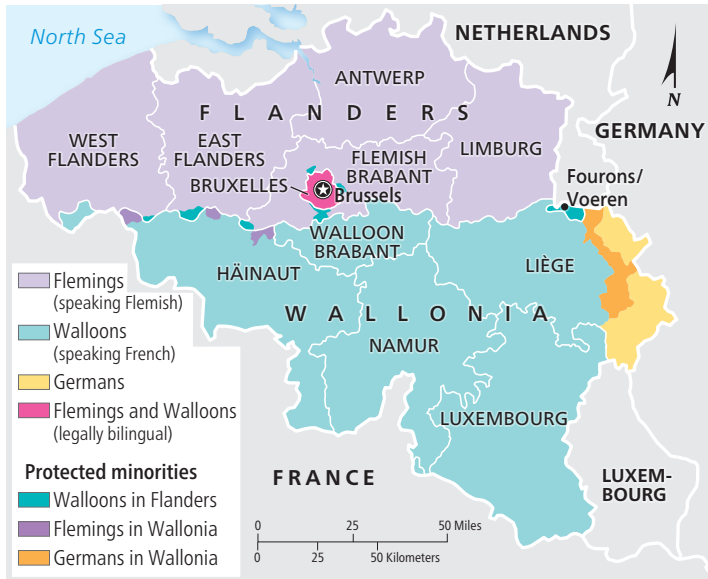
Belgium: Barely Speaking

The small country of Belgium has three official languages—Dutch, French, and German. A language boundary sharply divides Belgium into three regions. In the southern region of the country, known as Wallonia, French predominates. In northern Belgium, known as Flanders, the predominant language is Flemish, a dialect of Dutch (Figure 5-37). Brussels, the capital city, is officially bilingual, and signs there are in both French and Flemish. Belgium also has a small German-speaking region along the country's eastern border with Germany.

Antagonism between Belgium's Flemish Community and the French Community is aggravated by economic and political differences. Historically, the French Community dominated Belgium's economy and politics, and French was the official state language. But in recent years Flanders has been much more prosperous than Wallonia, and the Flemish-speaking northerners do not wish to see their taxes spent in the south.

In response to pressure from Flemish speakers, Belgium has been divided into two highly autonomous regions, Flanders and Wallonia. Each elects an assembly that controls cultural affairs, public health, road construction, and urban development in its region. But for many in Flanders, regional autonomy is not enough. They want to see Belgium divided into two independent countries. Were that to occur, Flanders would have one of Europe's highest incomes per capita and Wallonia would have one of the lowest.

▲ **FIGURE 5-36 LANGUAGE DIVERSITY IN SWITZERLAND** Switzerland has four official languages that predominate in different regions of the country.

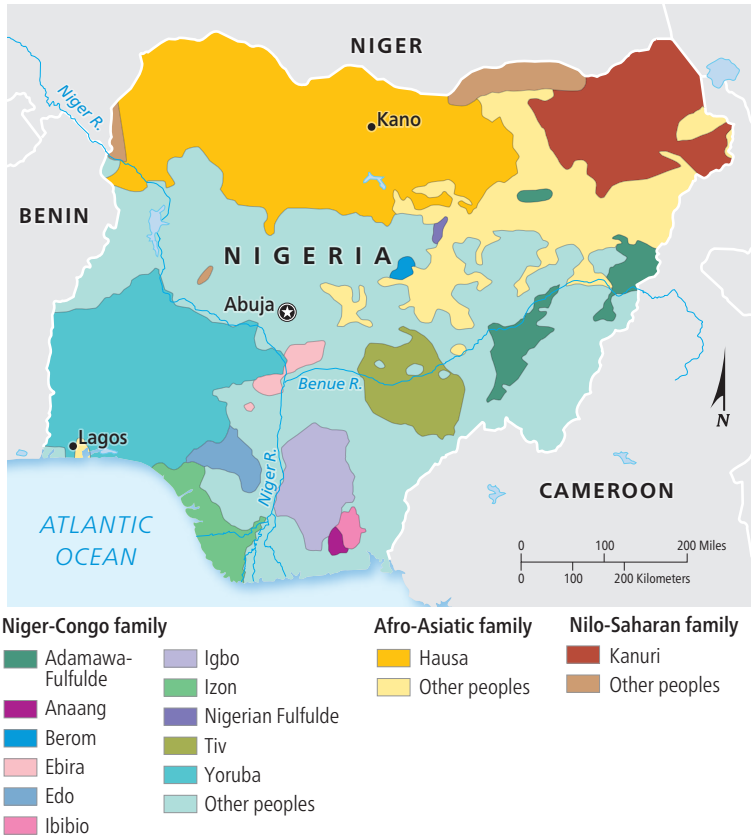


▲ **FIGURE 5-37 LANGUAGE DIVERSITY IN BELGIUM** Flemish, a Dutch dialect, is the principal language in Flanders. French is the principal language In Wallonia.

Nigeria: Spatial Compromise

Africa's most populous country, Nigeria, provides an example of the tensions that can arise from the presence of many speakers of many languages. Nigeria has 520 distinct languages, according to *Ethnologue*, but only three (Hausa, Igbo, and Yoruba) are used by more than 10 percent of the country's population and only four others (Adamawa Fulfulde, Kanuri, Nigerian Fulfulde, and Tiv) by between 1 and 10 percent of the population (Figure 5-38). Religion further divides the country; the north is predominantly Muslim, and the south is predominantly Christian.

Groups living in different regions of Nigeria have often battled. The southern Igbo attempted to secede from Nigeria during the 1960s, and northerners have repeatedly claimed that the Yoruba discriminate against them. To reduce these regional tensions, the government has moved the capital from Lagos in the Yoruba-dominated southwest to Abuja in the center of the country, where none of the three major languages or two major religions predominates.



▲ **FIGURE 5-38 LANGUAGE DIVERSITY IN NIGERIA**

Pause & Reflect 5.3.4 What is the most widely used language in the same family as Hausa? What religion's holiest book is written in that language?

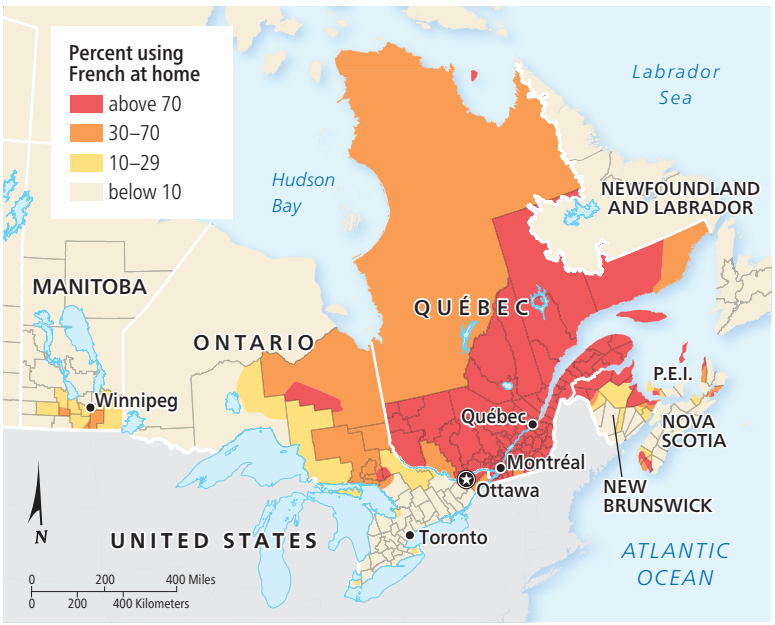
Canada: Bilingual Autonomy

French is one of Canada's two official languages, along with English. French is the first official language for 21 percent of Canada's population. In Québec, 94 percent of the people have knowledge of French, and French is the first language for 78 percent of Québécois (Figure 5-39). Colonized by the French in the seventeenth century, Québec was captured by the British in 1763, and in 1867, it became one of the provinces in the Confederation of Canada.

Until the late twentieth century, Québec was one of Canada's least-developed provinces. Its economic and political activities were dominated by an English-speaking minority, and the province suffered from cultural isolation and lack of French-speaking leaders. To promote French-language cultural values, the Parti Québécois – one of the province's leading political parties – advocates sovereignty (effectively independence from Canada), but voters have thus far not supported it.

Although around half of Québécois understand both French and English, the Québec government has made the exclusive use of French mandatory in many daily activities. Québec's Commission de Toponymie renamed French towns, rivers, and mountains that had been given English-language names.

Alarmed that one-fourth of Québécois speak a language other than French at home, the province's government has enacted stricter French-only laws. French must be the predominant language on all street signs and advertisements (Figure 5-40). Shopkeepers must greet customers with "bonjour," even in Montréal, which has many bilingual residents and English-speaking tourists, where the traditional greeting had been "bonjour-hi."



▲ **FIGURE 5-39 LANGUAGE DIVERSITY IN CANADA** Canada has two official languages. French predominates in Québec and English elsewhere.

▲ **FIGURE 5-40 FRENCH ONLY** Québec City.

KEY ISSUE

5.4 | Why Do Languages Survive or Perish?

The distribution of a language is a measure of the strength of a cultural group. English has diffused around the world because of the dominance of England and the United States over other territory on Earth's surface.

Endangered Languages

Learning Outcome 5.4.1 Define endangered languages, and relate the concept to language policies in Australia and New Zealand.

Ethnologue defines a language as endangered if it is losing users and is not being retained by the younger generation. According to the United Nations, an endangered language is one that children are no longer learning, and its remaining speakers use it less frequently.

Ethnologue considers 3,045 languages to face various levels of endangerment. More than 50 percent of the world's endangered languages are located in just eight countries: India, Brazil, Mexico, Australia, Indonesia, Nigeria, Papua New Guinea, and Cameroon (Figure 5-41). These eight countries – as well as neighboring ones – are the most linguistically diverse in the world.

Endangered Languages in the South Pacific

English is the most widely used language in Australia and New Zealand as a result of British colonization during the early nineteenth century. Settlers in Australia and New Zealand established and maintained outposts of British culture, including use of the English language.

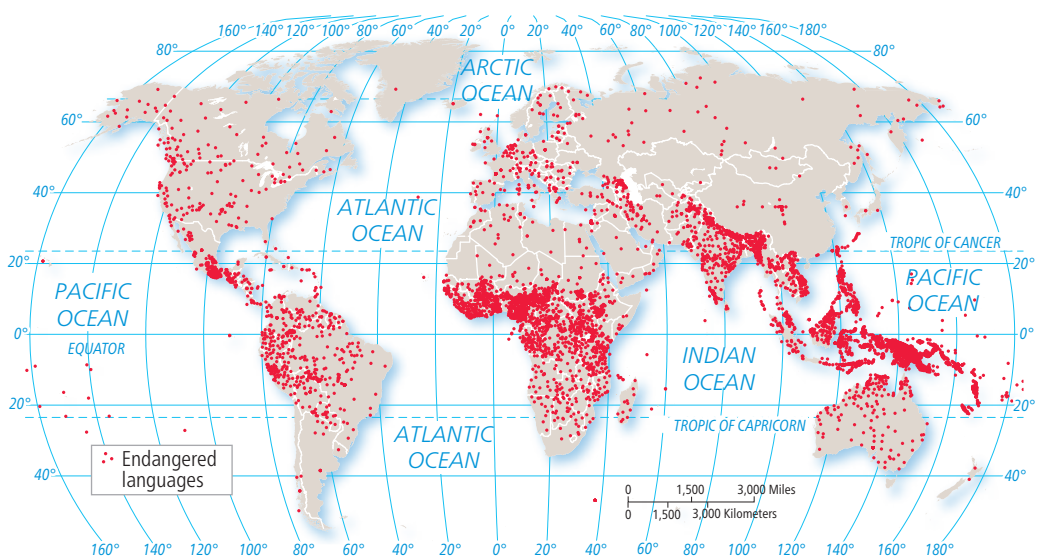
Australia. Around 3 percent of Australians (around 900,000 people) identify as indigenous, primarily Aboriginal and Torres Strait Islander. Most of Australia's approximately 250 indigenous languages have fewer than 10,000 speakers. Many elements of indigenous cultures are now being preserved, but education is oriented toward teaching English rather than maintaining local languages. English is the national language of Australia, although it is not an official language.

An essential element in maintaining British culture was restriction of immigration from non-English-speaking places. Fear of immigration was especially strong in Australia because of its proximity to Asian countries. Under a "White Australia" policy, every prospective immigrant was required to write 50 words of a European language dictated by an immigration officer. The dictation test was not eliminated until 1957. The Australian government now merely requires that immigrants learn English.

New Zealand. In New Zealand, 17 percent of the population is Māori, descendants of Polynesian people who migrated there around 700 years ago. In contrast with Australia, New Zealand has adopted policies to preserve the Māori language. Most notably, Māori is one of New Zealand's two official languages, along with sign language. A Māori Language Commission was established to preserve the language.

Despite official policies, English is the language used by more than 95 percent of New Zealanders, and immigrants must be fluent in English. Only 4 percent of New Zealanders are fluent in Māori. Preserving the language requires skilled teachers and the willingness to endure inconvenience compared to using English. Consequently, despite its official status and the efforts made to revive it, Māori is classified by *Ethnologue* as an endangered language.

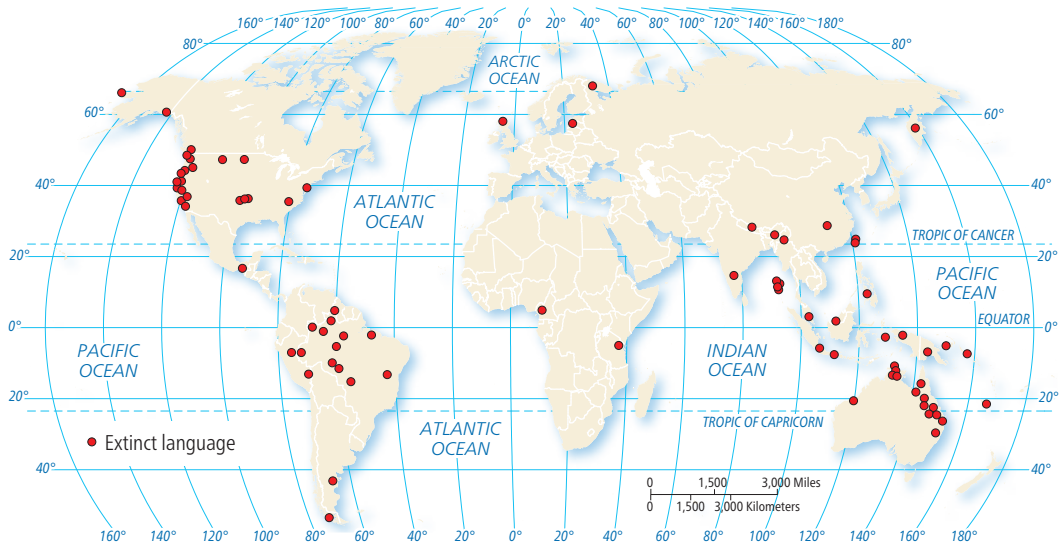
Pause & Reflect 5.4.1 Asia has 60 percent of the world's population but only 20 percent of the world's endangered languages. Why might Asia's large population centers have relatively few endangered languages?



▲ **FIGURE 5-41 ENDANGERED LANGUAGES**

Extinct Languages

An **extinct language** is a language that was once used by people in daily activities but is no longer in use. The extinction may follow this process: (1) A language becomes vulnerable to extinction when its use is restricted to certain domains, like allowed only in the home but not in public places, such as shops and offices. A vulnerable language is spoken by children, but only in some places. (2) A language becomes endangered when children are no longer learning it. (3) A language becomes moribund when it is spoken only by older people. (4) A language becomes extinct when it is no longer spoken.



▲ **FIGURE 5-42 LANGUAGES EXTINCT WORLDWIDE BETWEEN 2000 AND 2022**

For example, when Spanish missionaries reached the eastern Amazon region of Peru in the sixteenth century, they found more than 500 languages. Only 92 survive today, according to *Ethnologue*, and 14 of them face extinction in the very near future because fewer than 100 speakers remain. Of Peru's 92 surviving indigenous languages, only Cusco, a Quechuan language, is currently used by more than 1 million people.

Worldwide, 81 languages became extinct during the first two decades of the twenty-first century (Figure 5-42). The loss of many languages is a reflection of globalization. To be part of a global economy and culture, people choose to use a widely used language, leaving their traditional or indigenous language to disappear.

Extinct Languages in the United States

Ethnologue lists 22 languages based in the United States that became extinct in the first two decades of the twenty-first century. These are languages once spoken by groups of Native Americans, especially in the West (Figure 5-43).

One example is Klallam (also known as S'Klallam), a language once spoken in Washington's Olympic Peninsula and Vancouver Island, Canada. Klallam became extinct on February 4, 2014, when its last-known speaker, Hazel Sampson, died at age 103.

Since 1998, the language has been taught at Port Angelos High School in Washington, and six youths are reported to be able to speak some words of Klallam as their second language. A dictionary of Klallam was published in 2012. If someday a child is taught Klallam as his or her first language, perhaps by one of the six who know some words, then the language might be reclassified as reawakening.

The COVID-19 pandemic has taken its toll on languages. Dakota, a Sioux language, is critically endangered, with only 290 speakers, according to *Ethnologue*. The average age of the remaining speakers is around 70. The language was being taught at local schools and colleges, but the programs were halted during the pandemic. Mortality rates among both the elders and the teachers have been especially high on the reservation where most of the remaining Dakota speakers live. Tuscarora, an Iroquoian language of the Tuscarora people, became extinct when its last fluent speaker, Kenneth Patterson, died in 2020.

▲ **FIGURE 5-43 LANGUAGES EXTINCT IN THE UNITED STATES EXTINCT BETWEEN 2000 AND 2022** The dots point to the approximate locations where the recently extinct languages were last spoken.

Preserving Languages

Learning Outcome 5.4.2 Describe how some lesser-used languages are being protected.

Some languages are being preserved and protected. The United Nations has had a program since 2003 to preserve endangered languages. The European Union has identified 60 local languages that people are trying to preserve.

Recent efforts have bolstered languages belonging to the Celtic language branch of Indo-European language family. Preserving Celtic languages is of particular interest to English speakers because these languages offer insights into the cultural heritage of places that now speak English. Celtic languages were spoken in much of present-day Germany, France, northern Italy, and the British Isles 2,000 years ago. Today, Celtic languages survive only in remote parts of Scotland, Wales, and Ireland and on the Brittany peninsula of France (Figure 5-44).

Brythonic Celtic

The Celtic language branch is divided into Goidelic (Gaelic) and Brythonic groups. Speakers of Brythonic (also called Cymric or Britannic) fled westward during the Germanic invasions to Wales, southwestward to Cornwall, or southward across the English Channel to the Brittany peninsula of France.

▲ **FIGURE 5-44 CELTIC LANGUAGES**

Welsh. Wales – the name derived from the Germanic invaders' word for foreign – was conquered by the English in 1283. Welsh remained dominant in Wales until the nineteenth century, when many English speakers migrated there to work in coal mines and factories. A 2020 census found 892,000 Welsh speakers in Wales, 30 percent of the population. Another 110,000 Welsh speakers live across the border in England. The percentage of Welsh speakers is higher in the west.

Britain's 1988 Education Act made Welsh language training a compulsory subject in all schools in Wales, and Welsh history and music have been added to the curriculum. In 2011, the government of the United Kingdom made Welsh the official language in Wales.

Cornish. Cornish was the Celtic language spoken in Cornwall, the southwestern-most county of the United Kingdom. Its last-known native speaker of Cornish died in 1777. Cornish was revived in the twentieth century, and around 500 are now estimated to be fluent in Cornish. Some signs are now posted in Cornish.

Breton. Brittany, like Cornwall, is an isolated peninsula that juts out into the Atlantic Ocean. As part of France, Brittany has a language, Breton, containing more words borrowed from French than do the other Celtic languages. The number of Breton speakers has declined from around 1 million in 1950 to around 200,000 today. The Public Office for the Breton Language was established in 2010 to promote the use of the language, including road signs.

Goidelic Celtic

This group of Celtic languages originated in Ireland. Two Goidelic languages survive: Irish and Scottish Gaelic.

Irish. Irish is one of two official languages in the Republic of Ireland, along with English. It was the predominant language spoken in Ireland for most of history but declined in importance in the eighteenth and nineteenth century. Ireland was under the control of the English-speaking United Kingdom, and Ireland's Roman Catholic Church encouraged the use of English instead of Irish. The emigration of many Irish during the nineteenth century resulted in fewer people left in Ireland who could speak Irish.

An estimated 1.2 million people can speak Irish, but only about 170,000 speak it as a first language. As with Welsh, the percentage of people speaking Irish is higher in the more remote areas of the country, especially along the west coast. An Irish-language TV station began broadcasting in 1996. English road signs were banned from portions of western Ireland in 2005. In 2010, the government of Ireland adopted a twenty-year plan to increase the use of Irish.

Scottish Gaelic. In Scotland, around 1 percent of the people speak Scottish Gaelic. Scottish Gaelic is different than Scots, which *Ethnologue* classifies as an Indo-European Germanic branch language separate from English. Scots is more prevalent in Scotland's southern lowlands nearest to England, whereas Scottish Gaelic is more likely to be found in more remote northern highlands and islands.

Basque: Europe's Only Isolated Language

Basque, called Euskara by the Basque people, is the sole example of a vibrant isolated language in Europe. It is apparently the only language currently spoken in the region that survives from the period before the arrival of Indo-European speakers. No attempt to link Basque to the common origin of the other European languages has been successful.

Basque may have once been spoken over a wider area but was abandoned where its speakers came in contact with Indo-European languages. It is now the first language of around 900,000 people in the Pyrenees Mountains of northern Spain and southwestern France. Basque's lack of connection to other languages reflects the isolation of the Basque people in their mountainous homeland. This isolation has helped them preserve their language in the face of the wide diffusion of Indo-European languages (Figure 5-45).

Icelandic: An Unchanging Language

Icelandic is not classified as an isolated language because it is in the North Germanic language group of the Germanic language branch of the Indo-European language family. Icelandic's significance is that over the past 1,000 years, it has changed less than any other language in the Germanic language branch. As was the case with England, people in Iceland speak a Germanic language because their ancestors were Germanic speakers who migrated to the island from the east, in this case from Norway. Norwegian settlers colonized Iceland in 874 C.E.

When an ethnic group migrates to a new location, it takes along the language spoken in the former home. The language spoken by most migrants – such as the Germanic invaders of England – changes in part through interaction with speakers of other languages. But in the case of Iceland, the Norwegian immigrants had little contact with speakers of other languages when they arrived in Iceland, and they did not have contact with speakers of their language back in Norway. After centuries of interaction with other Scandinavians, Norwegian and other North Germanic-language speakers had adopted new words and pronunciation, whereas the isolated people of Iceland had less opportunity to learn new words.

Based on the plaque of Figure 5-46, scientists may expect Icelandic to remain an institutional language for the foreseeable future. Just in case it doesn't, though, the plaque also includes English.

Pause & Reflect 5.4.2 The bottom line in the banner in Figure 5-45 is in Basque. Use an online translation app to identify the language in the top line. Why might that language be displayed on the sign?

▲ **FIGURE 5-45 BASQUE LANGUAGE** Demonstration in Bayonne, France, protests a French law making it harder to teach languages other than French. The bottom line is in Basque.

(a)

(b)

▲ **FIGURE 5-46 ICELANDIC LANGUAGE** (a) Scientists mark the loss of Iceland's Ok glacier by affixing a plaque (b) with a letter to the future in Icelandic and English.

New & Growing Languages

Learning Outcome 5.4.3 Summarize processes of growing and reviving languages.

While the number of languages in the world is declining, a handful of languages are being invented or revived. In other cases, endangered languages are being preserved before they become extinct. These efforts reflect the importance that groups place on language as an element of local culture.

Growing Languages

Hebrew is an example of a language that was once rarely used but is more commonly used now. Most of the Jewish Tanakh and Christian Old Testament were written in Hebrew. A language of daily activity in biblical times, Hebrew diminished in use in the fourth century B.C.E. and was thereafter retained primarily for Jewish religious services. At the time of Jesus, most people in present-day Israel spoke Aramaic, which in turn was replaced by Arabic.

When Israel was established as an independent country in 1948, Hebrew became one of the new country's two official languages, along with Arabic (Figure 5-47). Since 2018, Hebrew has been the country's only official language. Hebrew was chosen because the Jewish population of the State of Israel consisted of refugees and migrants from many countries who spoke many languages. Because Hebrew was still used in Jewish prayers, no other language could so symbolically unify the disparate cultural groups in the new country.

▲ **FIGURE 5-47 HEBREW** Sign at sea level in Hebrew, French, and English on the road between Jerusalem (754 meters or 2,474 feet above sea level) and the Dead Sea (431 meters or 1,414 feet below sea level). Refer to Figure 6-63.

The task of making Hebrew a modern language was formidable. Words had to be created for thousands of objects and inventions unknown in biblical times, such as telephones, cars, and electricity. The revival effort was initiated by Eliezer Ben-Yehuda, who lived in the Palestine region before the creation of the State of Israel and refused to speak any language other than Hebrew. Ben-Yehuda is credited with the invention of 4,000 new Hebrew words – related, when possible, to ancient ones – and the creation of the first modern Hebrew dictionary.

Reviving Languages

The Miami Native American Tribe traditionally spoke the Myaamia language (listed in *Ethnologue* as Miami), until they were forced to migrate in the nineteenth century from their ancestral homelands in the Lower Great Lakes to northeastern Oklahoma. The last native speakers died in the 1960s.

Daryl Baldwin, a citizen of the Miami Tribe of Oklahoma and director of the Myaamia Center at Miami University in Ohio, has acquired second language proficiency in Myaamia. Baldwin's children learned Myaamia as their first language in the home – the first in a half-century to be first-language Myaamia speakers (Figure 5-48).

Based on the language skills of the Baldwin family, as well as other Miami people, *Ethnologue* has reclassified Myaamia from an extinct language to a reawakening language. Before reclassifying Myaamia, *Ethnologue* first undertook an in-depth study of the Baldwin family's language skills, conducted by Dr. Wesley Leonard, a Native American language expert at the University of California, Riverside.

Pause & Reflect 5.4.3 What is an example of a recently invented word in English? What factors may have contributed to its invention?

▲ **FIGURE 5-48 REVIVING THE MYAAMIA LANGUAGE**

Inventing Languages

Isolated languages continue to be identified and documented, and entirely new languages are found. Here are recent examples:

Warlpiri Rampaku. A language called Warlpiri Rampaku, or Light Warlpiri, is spoken by about half of the 700 residents of the village of Lajamanu in Australia's Northern Territory. No one outside the village knew about the language until a University of Michigan researcher, Carmel O'Shannessy, heard it in 2013.

Young people had invented the new language. It started with parents speaking to their babies in a combination of three languages: Strong Warlpiri, English, and a creole language that combines English and Strong Warlpiri. As they got older, the three languages merged into an entirely new one through actions such as inventing new verb endings and tenses. The oldest speaker was found to be age 35. *Ethnologue* classifies Warlpiri as a stable language (Figure 5-49), but it does not yet recognize Warlpiri Rampaku as a separate language.

▲ **FIGURE 5-49 WARLPIRI SPEAKERS** Yuendumu, Australia.

Jedek. A language spoken by 280 people in a village in Malaysia was identified in 2017 by linguists at Lund University as Jedek. The villagers identify themselves to outsiders as speakers of Batek (Figure 5-50), but the Lund linguists found Jedek to be a separate language in the Austro-Asiatic language family. *Ethnologue* classifies Batek as an endangered language spoken by around 1,000 people, and it does not include Jedek as a separate language.

▲ **FIGURE 5-50 JEDEK OR BATEK LANGUAGE SPEAKERS** Jeli, Malaysia.

Koro Aka. A research team from Oregon's Living Tongues Institute for Endangered Languages was in India to study rarely spoken languages. They heard people in the area speaking a language that was not listed in *Ethnologue*. The researchers concluded that what they were hearing was a distinct language belonging to the Sino-Tibetan family. The language, named Koro Aka, is still not included in *Ethnologue*.

Gooniyandi. Gooniyandi is used by only around 100 people in Western Australia, and with few children learning the language, *Ethnologue* classifies it as endangered. In an attempt to preserve the language, speakers of Gooniyandi constructed an alphabet for the language in 1984, making it perhaps the world's newest written language.

Multicultural London English. Schoolchildren in the United Kingdom have invented a language known as Multicultural London English (MLE) or Urban London English (Figure 5-51). MLE facilitates communication among children of immigrants to London from dozens of countries. Examples of MLE include the use of *man* as a pronoun and *bare* to mean "plenty" or "a lot of something." For now, MLE can be regarded as a dialect of English, but in the decades ahead it may grow sufficiently different from English to become a separate language, much as Scots is classified as separate from English.

▲ **FIGURE 5-51 MULTICULTURAL LONDON ENGLISH** Beckton, East London.

5 Summary & Review

KEY ISSUE

5.1 | Where Are Languages Distributed?

- Languages are classified as institutional, stable, and endangered.
- Languages are organized into families and branches.
- Fifteen language families are used by at least 8 million people worldwide.

KEY ISSUE

5.2 | Why Do Languages Diffuse?

- The Indo-European family has four widely spoken branches.
- The origin and early diffusion of language families such as Indo-European is speculative because these language families existed before recorded history.
- Individual languages, such as English and languages of the Romance branch, have documented places of origin and patterns of diffusion.
- English has become the world's most important lingua franca, especially in the internet era.

KEY ISSUE

5.3 | Why Do Languages Vary Among Places?

- A dialect is a regional variation of a language.
- The United States has several major dialects.
- The distinction between a dialect and an entirely different language is not always clear-cut.
- Some countries more peacefully embrace multiple languages than do others.

KEY ISSUE

5.4 | Why Do Languages Survive or Perish?

- Many languages have become extinct, and others are threatened with extinction.
- Some endangered languages are being preserved and protected.
- Some lesser-used languages are growing in number of speakers.
- Other languages are being invented, in some cases through combination with English.

Thinking Geographically

KEY ISSUE

5.1 | Where Are Languages Distributed?

Nearly one-half of the world's people speak a language in the Indo-European family. The road sign in Figure 5CR-1 is in four languages. How many can you identify? How many writing systems appear to be represented in the sign? Where in the world is this sign? What accounts for the choice of languages on this sign?

FIGURE 5CR-1 SIGN IN FOUR LANGUAGES

KEY ISSUE

5.2 | Why Do Languages Diffuse?

Chinese languages are written with logograms. For example, Figure 5CR-2 shows several logograms related to bodies of water. What similarities and differences can you detect in these various water-related logograms? In what ways might you make use of logograms when you communicate through social media?

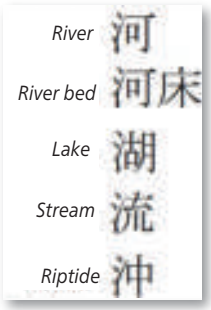


FIGURE 5CR-2 LOGOGRAMS

KEY ISSUE

5.3 | Why Do Languages Vary Among Places?

Dialects and subdialects exist in many languages, not just English. For example, the word for *car* varies among Spanish dialects. What patterns do you see in the distribution of different words for *car* through the Western Hemisphere? What might account for those patterns?

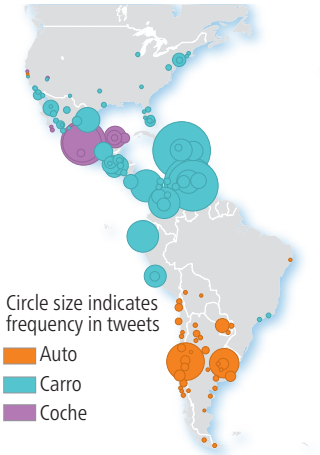


FIGURE 5CR-3 THE WORD FOR *CAR* IN SPANISH DIALECTS

KEY ISSUE

5.4 | Why Do Languages Survive or Perish?

New languages are constantly being discovered. Most frequently discovered are new sign languages. What might account for the relative frequency of new sign languages compared with spoken ones?

FIGURE 5CR-4 CHILDREN IN OAXACA, MEXICO, WHERE A NEW SIGN LANGUAGE WAS RECENTLY DOCUMENTED

Key Terms

African American Vernacular English (AAVE) A dialect used by some Black Americans.

Centrifugal force A cultural value that tends to pull people apart.

Centripetal force A cultural value that tends to unify people.

Creole (or **creolized) language** A language that results from the mixing of a colonizer's language with the indigenous language of the people being dominated.

Denglish A combination of Deutsch (the German word for German) and English.

Dialect A regional variety of a language distinguished by vocabulary, spelling, and pronunciation.

Endangered language A language that is threatened or dying because it is losing users and may not be retained by the younger generation.

Extinct language A language that was once used by people in daily activities but is no longer used.

Franglais A combination of *français* and *anglais* (the French words for French and English, respectively).

Institutional language A language used in education, work, mass media, and government.

Isogloss A boundary that separates regions in which different language usages predominate.

Isolated language A language that is unrelated to any other languages and therefore not attached to any language family.

Language A system of communication through speech, movement, sounds, or symbols that a group of people understands to have the same meaning.

Language branch A collection of languages related through a common ancestor that can be confirmed through archaeological evidence.

Language family A collection of languages related to each other through a common ancestor long before recorded history.

Language group A collection of languages within a branch that share a common origin in the relatively recent past and display relatively few differences in grammar and vocabulary.

Lingua franca A language mutually understood and commonly used in trade by people who have different native languages.

Linguist A specialist in the study of human language.

Literary tradition A language that is written as well as spoken.

Logogram A symbol that represents a word rather than a sound.

Mutual intelligibility The ability of people communicating in two ways to readily understand each other without prior familiarity or special effort.

Official language The language adopted for use by a government for the conduct of business and publication of documents.

Pidgin language A form of language that adopts a simplified grammar and limited vocabulary of a lingua franca; used for communications among speakers of two different languages.

Received Pronunciation (RP) The dialect of English commonly used by politicians, broadcasters, and actors in the United Kingdom.

Spanglish A combination of Spanish and English spoken by some Hispanic Americans.

Stable language A language in daily use by people of all ages, from children to elderly individuals.

Standard language The form of a language used for official government, business, education, and mass communication.

Subdialect A subdivision of a dialect.

Working language A language designated by an international organization or corporation as its primary means of communication for daily correspondence and conversation.

International Geographic Mapping Explorations

Geography of the English Language

The complex geography of languages is closely tied to migration. The changing geographical distribution of the English language relates to patterns of migration of speakers of a variety of languages that contribute to the development of English. The Norman victory in the Battle of Hastings in 1066 that brought the French language to England is depicted in the Bayeux Tapestry, a 70-meter (230-feet) long tapestry made in 1077 (Figure 5CR-5). The tapestry is now displayed in a museum in Bayeux, France.

▲ **FIGURE 5CR-5 BAYEUX TAPESTRY**

. . . . Geographers recognize that the origin, diffusion, and distribution of languages result from patterns of migration of peoples. Language is an important element in the distinctive cultural identity of particular places. It also the means through which other cultural values and beliefs, such as religions, are communicated, as we will see in the next chapter, Religions. . . .

6 Religions

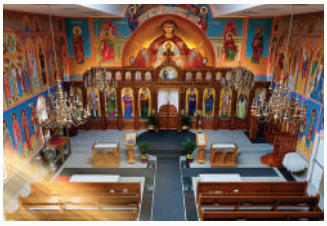
KEY ISSUES

6.1 Where Are Religions Distributed?

Some religions are highly clustered in one or two of Earth's regions, whereas others are distributed throughout the world. Individual religions also have distinctive distributions within regions.

6.2 Why Do Religions Have Distinctive Distributions?

Some religions have well-documented places of origin and have diffused extensively. Others have unknown origins and have experienced limited diffusion.



6.3 Why Do Religions Organize Space in Specific Patterns?

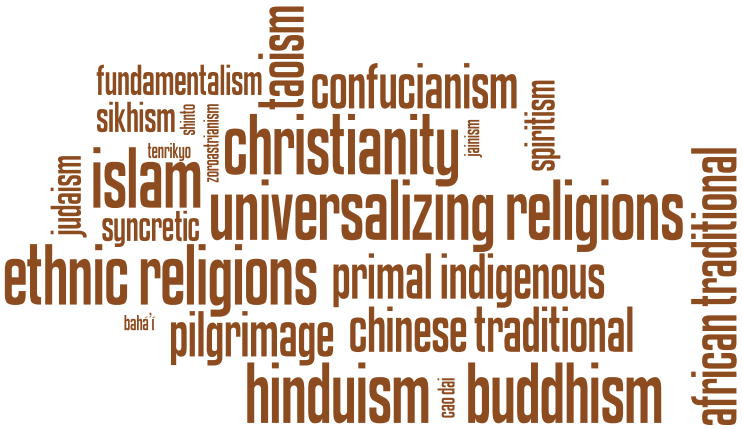
Religious groups derive distinctive meaning from the physical landscape and construct places for worship and other religious practices.

6.4 Why Do Territorial Conflicts Arise Among Religious Groups?

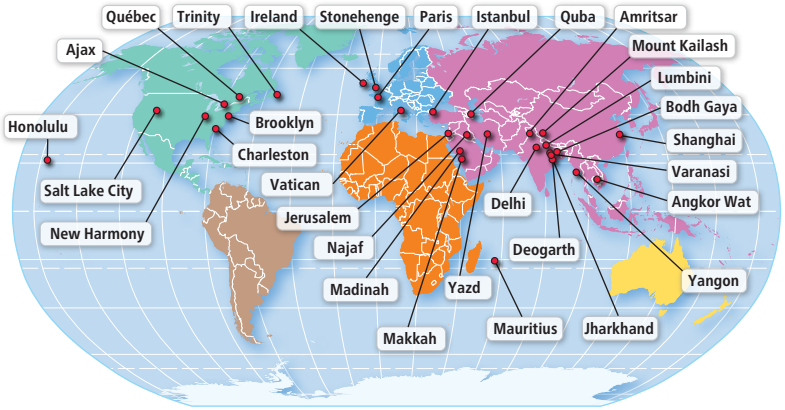
Adherents of various religions have disputes over Earth's territory. The attempt by adherents of one religion to organize a portion of Earth's surface can create conflicts with governments or other religious groups.

▶ Interfaith prayer service, San Diego.

Geographers document the places where various religions are located in the world and offer explanations for why some religions have widespread distributions and others are highly clustered in particular places. Many people care deeply about their religion and draw from religion their core values and beliefs, an essential element of the definition of cultural identity.



LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

6.1 | Where Are Religions Distributed?

Geographers recognize that religions are essential to understanding the spatial patterns underlying how humans occupy Earth. The predominant religion varies among regions of the world as well as among regions within North America. An essential element of culture, religion gives many people a sense of who they are, what they value, and how they relate to other people, the natural world, and questions of ultimate meaning.

Religions & Geography

Learning Outcome 6.1.1 Identify the world's major religions, and classify them by type.

Religion, like language, can be a source of pride and an expression of identity for members of a particular culture. Religious values are important in understanding not only how people identify themselves, but also the meaningful ways that they organize the landscape.

As with language, migrants take their religion with them to new locations, but language and religion have important geographic differences. Although most migrants learn the language of the new location, they typically retain their religion. Furthermore, people can learn a globally important language such as English and, at the same time, still speak the language of their local culture, but many (though not all) religions require exclusive adherence, so adopting a new religion could require turning away from the former one.

Only a few religions can claim the adherence of large numbers of people. This section identifies the major religions and their distributions.

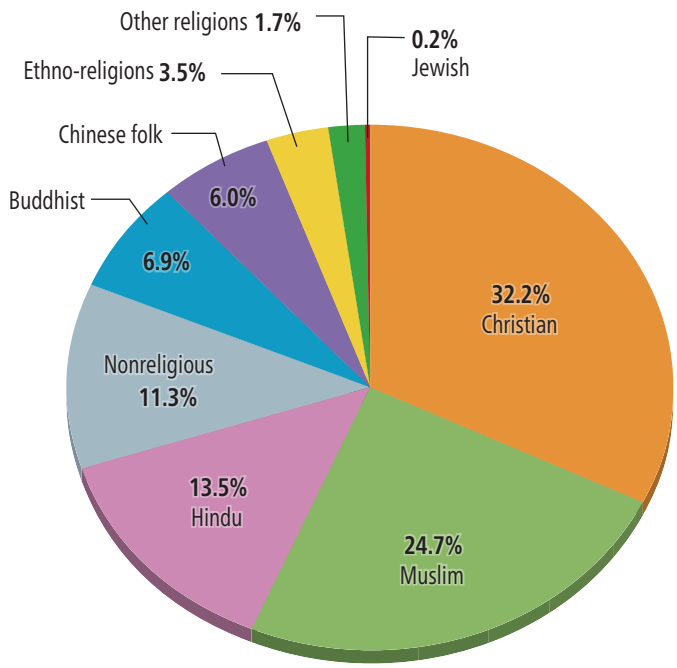
Reliable statistics on the number of adherents are difficult to obtain. No official count of religious membership is taken in the United States or in many other countries. Statistics on the number of followers of religions can be controversial; adherents may feel that their religion has been undercounted and therefore accorded less prominence than deserved in world and regional data.

Most international statistics in this chapter come from Adherents.com, the Association of Statisticians of American Religious Bodies, the Pew Research Center, and World Religion Database. None of these organizations is affiliated with a particular religion. The statistics are built on self-identification – that is, whatever people themselves view as the particular religious groups to which they belong. They do not measure how actively an individual practices a religion.

Classifying Religions

The world's religions can be grouped as follows:

- **The three largest universalizing religions.** A **universalizing religion** attempts to be global – to appeal to all people, wherever they may live in the world, not just to those of one culture or location. The three universalizing religions with the largest number of adherents in the world are Christianity, Islam, and Buddhism. Together, they claim the adherence of around 64 percent of the world's people (Figure 6-1).
- **The three largest ethnic religions.** An **ethnic religion** appeals primarily to one ethnic or cultural group, or the people of a specific region. The three with the largest number of adherents are Hinduism, Chinese folk, and ethno-religions. Together, they claim the adherence of around 23 percent of the world's people.
- **Other religions.** Another 2 percent of the world's people adhere to a religion other than the three largest universalizing religions and three largest ethnic religions. Four of these other religions have at least 15 million adherents: New Religions, Sikhism, Spiritism, and Judaism. Five other religions have between 3 and 9 million adherents: Daoism, Confucianism, Bahá'í, Jainism, and Shinto. Many other religions have fewer than 1 million adherents.
- **Nonreligious.** The remaining 11 percent of the world's population express no religious interest or preference and do not participate in any organized religious activity. The World Religion Database identifies two beliefs among non-religionists. **Atheism** is the belief that God does not exist. **Agnosticism** is the belief that the existence of God cannot be proven or disproven empirically.



▲ **FIGURE 6-1 WORLDWIDE PERCENTAGES ADHERING TO VARIOUS RELIGIONS**

Sources: Pew Research Center and World Religion Database

Regional Diversity of Religions

Some world regions have a large majority of adherents of one religion. Around 92 percent of Latin Americans and more than 70 percent of Europeans and North Americans identify themselves as adhering to Christianity, and more than 90 percent of the people in Central Asia and of Southwest Asia & North Africa identify themselves as adhering to Islam (Figure 6-2).

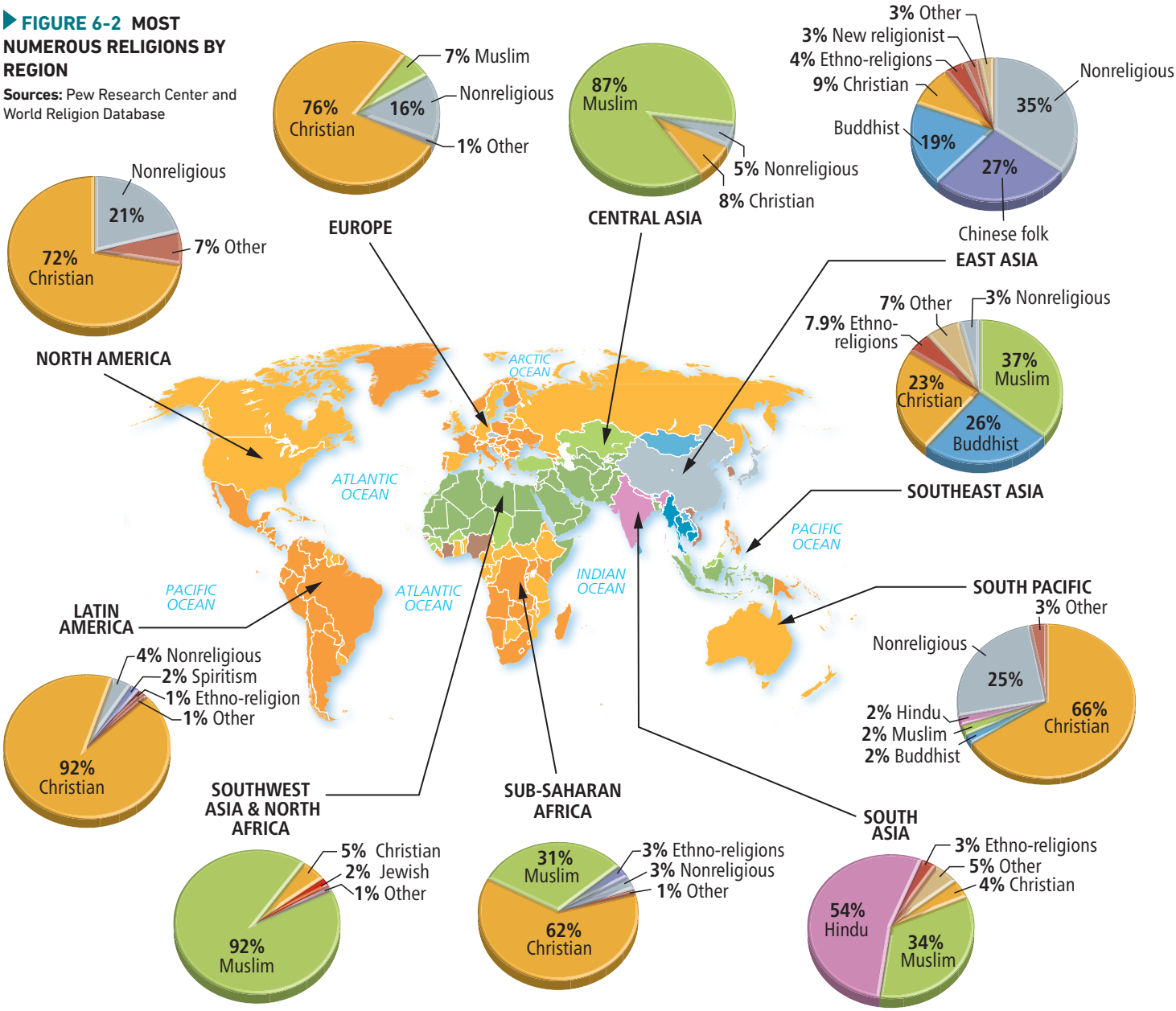
Other world regions have more of a mix of religions. The four regions with more diverse religious composition are East Asia, South Asia, Southeast Asia, and sub-Saharan Africa:

- In East Asia, more than one-third of the people are nonreligious, around one-fourth of the people adhere to Chinese folk religions, and around one-fifth are Buddhists.
- In South Asia, around one-half of the people are Hindus and one-third Muslims. However, adherents are sharply divided by country; India is around 80 percent Hindu, whereas Bangladesh and Pakistan are more than 90 percent Muslim.
- In Southeast Asia, around one-third are Muslims, one-fourth are Buddhists, and one-fourth are Christians. Indonesia (the region's most populous country) is 87 percent Muslim, Cambodia and Thailand are more than 90 percent Buddhist, and the Philippines is more than 90 percent Christian.
- In sub-Saharan Africa, around two-thirds are Christian and one-fifth are Muslim. Christians are more numerous in the south and Muslims in the north.

Pause & Reflect 6.1.1 In what ways is the distribution of religions similar to that of language families (refer to Chapter 5 Languages)?

FIGURE 6-2 MOST NUMEROUS RELIGIONS BY REGION

Sources: Pew Research Center and World Religion Database



Distribution of Christians

Learning Outcome 6.1.2 Analyze regional variations in the distribution of Christian branches.

Many religions, including the three most widely practiced universalizing religions, are divided into congregations, denominations, and branches. A **congregation** is a local assembly of persons brought together for common religious worship. A **denomination** unites a number of local congregations in a single legal and administrative body. A **branch** is a large and fundamental division within a religion.

Christianity has three major branches: Roman Catholic, Protestant, and Orthodox. In addition, many Christians belong to churches that do not consider themselves to be within any of these three branches. Roman Catholics comprise approximately 49 percent of the world's Christians, Protestants around 24 percent, Orthodox around 11 percent, and Independent Christians 16 percent.

Distribution of Branches in Europe

Overall in Europe, 45 percent of Christians are Roman Catholic, 16 percent are Protestant, 37 percent are Orthodox, and 2 percent are Independent Christians. Roman Catholicism is the most widely practiced branch of Christianity in the southwest and east of Europe, Protestantism in the northwest, and Orthodoxy in the east and southeast (Figure 6-3).

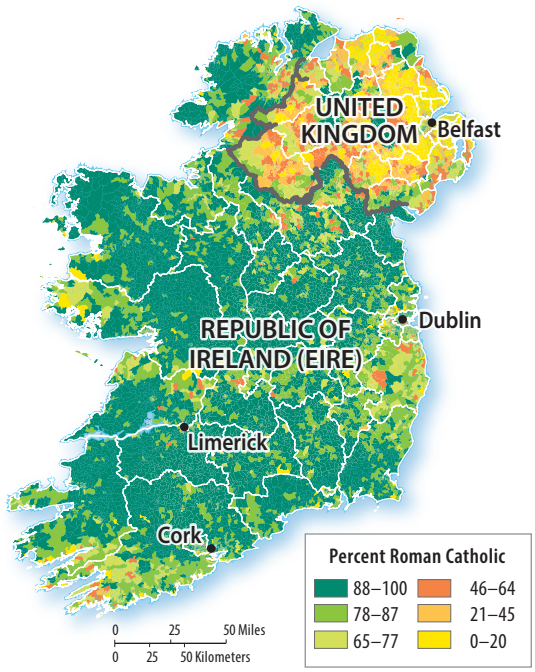
The regions of Roman Catholic and Protestant majorities frequently have sharp boundaries, even when they run through the middle of countries. For example, Germany, the Netherlands, and Switzerland have approximately equal percentages of Roman Catholics and Protestants, but the Roman Catholic populations are concentrated in the south of these countries and the Protestant populations in the north.

A sharp boundary runs through the island of Eire (Ireland) (Figure 6-4). The entire island was an English colony for many centuries and was made part of the United Kingdom in 1801. Following a succession of bloody confrontations, the Republic of Ireland achieved independence in 1937. However, a majority in the northern part of Eire voted to remain in the United Kingdom. The Republic of Ireland is 78 percent Roman Catholic, whereas Northern Ireland is 44 percent were raised Protestant and 46 percent Roman Catholic.

Within Northern Ireland, Roman Catholics were long victimized by discriminatory practices, such as exclusion from higher-paying jobs and better schools. Campaigns to end discrimination led to three decades of violence beginning in the 1960s, a period known as "the Troubles," during which more than 3,500 people died. A 1998 peace agreement, which provided for the two religious groups to share power, has reduced the level of violence since 1999.

When both the Republic of Ireland and the United Kingdom were members of the European Union (EU), the boundary between the two parts of Ireland was open for the movement of goods and people. After the United Kingdom withdrew from the EU, a complicated system was put in place to try to minimize the challenges of moving people and goods across the border.

▲ **FIGURE 6-3 MOST NUMEROUS RELIGIONS AND BRANCHES IN EUROPE**



▲ **FIGURE 6-4 DISTRIBUTION OF ROMAN CATHOLICS IN IRELAND**

Distribution of Branches in the Western Hemisphere

Christianity is by far the most widely practiced religion in the Western Hemisphere. Christians comprise 79 percent of the population of the Western Hemisphere. This includes 92 percent of Latin Americans and 72 percent of North Americans. People unaffiliated with any religion comprise 4 percent of Latin Americans and 21 percent of North Americans.

At the regional scale within the Western Hemisphere, a sharp boundary exists between North America and Latin America in the predominant branches of Christianity. Roman Catholics comprise 83 percent of Christians in Latin America and 33 percent in North America.

The diversity of faiths in the United States is displayed in Table 6-1. Roman Catholics comprise 21 percent of the U.S. population, Evangelical Protestants 17 percent, Mainline Protestants 12 percent, historically Black churches 8 percent, other Christians 7 percent, other faiths 6 percent, and nonreligious 28 percent.

In the United States, the Southern Baptist Convention is the most numerous Evangelical Protestant church, and Methodist is the most numerous Mainline Protestant church. Roman Catholics in the United States are more numerous in the Northeast and Southwest, whereas Evangelical Protestants are most numerous in the Southeast. Around 28 percent of Americans are unaffiliated, and most of them respond that they are "nothing in particular."

Most of the historically Black congregations and churches in the United States formed before 1800 were founded by free Black Americans (Figure 6-5). After the practice of slavery was abolished, segregationist attitudes among white people discouraged and even prevented Black people from worshiping in the same churches as Whites. As a result, Black Americans often established congregations and church facilities separate from their white neighbors. The churches established by Black people created communities and worship practices that were culturally distinct from other churches, including unique and empowering forms of Christianity that included elements of African spiritual traditions.

Other less numerous faiths have distinctive distributions within the United States. Members of The Church of Jesus Christ of Latter-day Saints (Mormons) regard their church as separate from the three branches of Christianity. About 2 percent of Americans are members of the Latter-day Saints, and a large percentage is clustered in Utah and surrounding states. Other less numerous faiths have distinctive distributions within the United States.

Pause & Reflect 6.1.2 Which migration factors help to explain the distribution of branches of Christianity within North America?

TABLE 6-1 | Religions of the United States, 2020

Figures are percent of all Americans.

Christian		**66**
Roman Catholic	21	
Evangelical Protestant	17	
Mainline Protestant Churches	12	
Historically Black Churches	8	
Other Protestant	5	
Latter-day Saints	2	
Orthodox	1	
Jewish		1
Buddhist		1
Muslim		1
Hindu		1
Other religions		2
Nonreligious		28

FIGURE 6-5 HISTORICALLY BLACK CHURCH Mother Emanuel AME Church, Charleston, South Carolina, service observing Emancipation Day (January 1), the day In 1863 that President Abraham Lincoln issued the Emancipation Proclamation, abolishing slavery in the United States.

Distribution of Buddhists & Muslims

Learning Outcome 6.1.3 Describe the distribution of the major branches of Buddhism and Islam.

Buddhism is clustered primarily in East Asia and Southeast Asia. Islam is the predominant religion of Central Asia and of Southwest Asia & North Africa. Like Christianity, Islam and Buddhism are divided into major branches with distinctive geographic distributions.

Branches of Buddhism

Buddhism split into more than one branch, as followers disagreed on interpretation of statements made by the founder, Siddhartha Gautama, known as the Buddha (Figure 6-6). The three main branches are Mahayana, Theravada, and Vajrayana (Figure 6-7). Mahayanists account for about 68 percent of Buddhists, primarily in China, Japan, and Korea. Theravadists comprise about 28 percent of Buddhists, especially in Cambodia, Laos, Myanmar, Sri Lanka, and Thailand. Vajrayanists, also known as Lamaists and Tantrayanists, comprise about 4 percent and are found primarily in Mongolia, Nepal (Figure 6-8), and Tibet.

An accurate count of Buddhists is especially difficult because only a few people actively participate in Buddhist institutions. Religious functions are performed primarily by monks rather than by the general public. The number of Buddhists is also difficult to count because Buddhism, although a universalizing religion, differs in significant respects from the Western concept of a formal religious system. Someone can be both a Buddhist and a believer in other Eastern religions, whereas Christianity and Islam both expect exclusive adherence. Most Buddhists in China and Japan, in particular, adhere at the same time to an ethnic religion.

▲ **FIGURE 6-7 DISTRIBUTION OF BRANCHES OF BUDDHISM**

▼ **FIGURE 6-6 STATUE OF THE BUDDHA, LUMBINĪ, NEPAL**

▲ **FIGURE 6-8 WORLD PEACE PAGODA IN LUMBINĪ, NEPAL, BIRTHPLACE OF THE BUDDHA**

Distribution of Muslims

The word *Islam* in Arabic means "submission to the will of God," and it has a similar root to the Arabic word for "peace." An adherent of the Islamic religion is known as a Muslim, which in Arabic means "one who surrenders to God."

On a standard world map, such as Figure 6-2, Islam predominates in Central Asia and in Southwest Asia & North Africa. However, on a cartogram, most of the world's Muslims live further east, in South and Southeast Asia. The countries with the most Muslims are Indonesia, Pakistan, India, and Bangladesh. These four countries together are home to more than 40 percent of the world's Muslims (Figure 6-9).

Islam's Branches

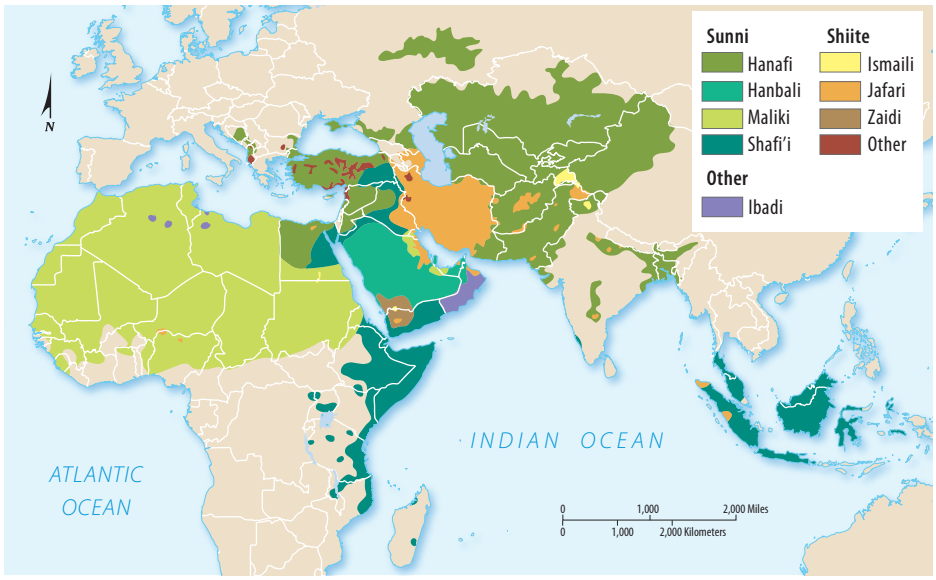
Islam is divided into two principal branches: Sunni and Shiite. The word *Sunni* comes from the Arabic for "people following the tradition of Muhammad." The word *Shiite* (sometimes spelled Shia) comes from the Arabic for "followers of Ali." Sunnis comprise 85 percent of Muslims and are the most numerous branch in most Muslim countries in Southwest Asia & North Africa as well as in Southeast Asia.

Sunnis follow various schools of thought and religious law, which have distinctive regional distributions (Figure 6-10). The Hanafi, Hanbali, Maliki, and Shafi'i schools of thought and religious law are named for their founders.

Shiites are the largest branch in Azerbaijan, Bahrain, Iran, Iraq, Lebanon, and Yemen. Nearly 40 percent of all Shiites live in Iran, 15 percent in Pakistan, 12 percent in India, and 10 percent in Iraq. Shiite Islam is divided into three principal schools of thought, based in part on disputes over leadership succession after the Prophet Muhammad. The largest, known as Jafari or Ithna Ashari, is the most widely followed tradition in Azerbaijan, Bahrain, Iran, Iraq, and Lebanon. Other traditions include the Ismaili and Zaidi. Ismailis are clustered in Pakistan and Zaidiyyahs in Yemen.

▼ **FIGURE 6-9 DISTRIBUTION OF THE WORLD'S MUSLIMS** In this cartogram, the size of the country is proportional to the number of Muslims in the country.

Source: Pew Research Center



▲ **FIGURE 6-10 DISTRIBUTION OF BRANCHES OF ISLAM**

Pause & Reflect 6.1.3 The Sunni Shafi'i (sometimes written Sufi) Muslims of Indonesia are located several thousand kilometers from other Sunni Shafi'i Muslims. What geography factor might account for the location of many Shafi'i Muslims in Indonesia?

Distribution of Ethnic Religions

Learning Outcome 6.1.4 Describe the distribution of Hinduism and other ethnic religions.

Ethnic religions typically have much more clustered distributions than do universalizing religions. Unlike universalizing religions, which typically diffuse from one culture to another, most of the adherents of the world's leading ethnic religions have remained embedded in the culture where they originated. Adherents to an ethnic religion are typically a people with a shared history, language, and destiny. Rituals are performed to pray for favorable environmental conditions or to give thanks for past success.

Distribution of Hindus

The ethnic religion with by far the largest number of followers is Hinduism, which is the world's third-largest religion, with around 1 billion adherents. Hinduism has no original founder or current leader and is the most diverse of the major religions in terms of practices. The average Hindu has allegiance to a particular god or concept within a broad range of possibilities. Some revere one god, whereas others worship many.

In contrast to the large universalizing religions, 95 percent of Hindus are concentrated in just one country (India), 2 percent are in Nepal, 1 percent are in Bangladesh, and small numbers are elsewhere. Hindus comprise around 80 percent of the population of India and Nepal around one-half of the population of Mauritius, a small island country in the Indian Ocean with only 1.3 million total inhabitants (Figure 6-11).

Pause & Reflect 6.1.4 What is the most-numerous universalizing religion in India?

Most Popular Hindu Deities

Many Hindus worship through deities, who are manifestations sent to help people communicate with the ultimate reality, known as Brahman. The most widely worshipped deity is Vishnu, a loving god incarnated as Krishna (Figure 6-12). The second-most widely worshipped deity is Shiva, a god who can be both protective and destructive (Figure 6-13). The third most widely worshipped deity, the goddess Shakti, is a creative source of energy (Figure 6-14).

FIGURE 6-11 DISTRIBUTION OF HINDUS

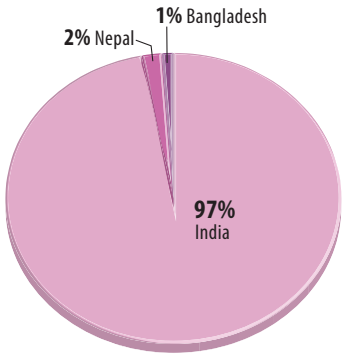


FIGURE 6-12 STATUE OF VISHNU
Delhi, India.

FIGURE 6-13 STATUE OF SHIVA
Angkor Wat, Cambodia.

FIGURE 6-14 STATUE OF SHAKTI
Mauritius.

Chinese Folk Religions

Religions based in East Asia show the difficulty of classifying ethnic religions and counting adherents. Chinese folk religions comprise a diverse collection of traditional indigenous practices with roots in ancient Chinese culture. Core beliefs include a regard for heaven as the source of moral behavior and veneration of ancestors. Rituals serve as unifying activities, such as observing Chinese Lunar New Year (Figure 6-15).

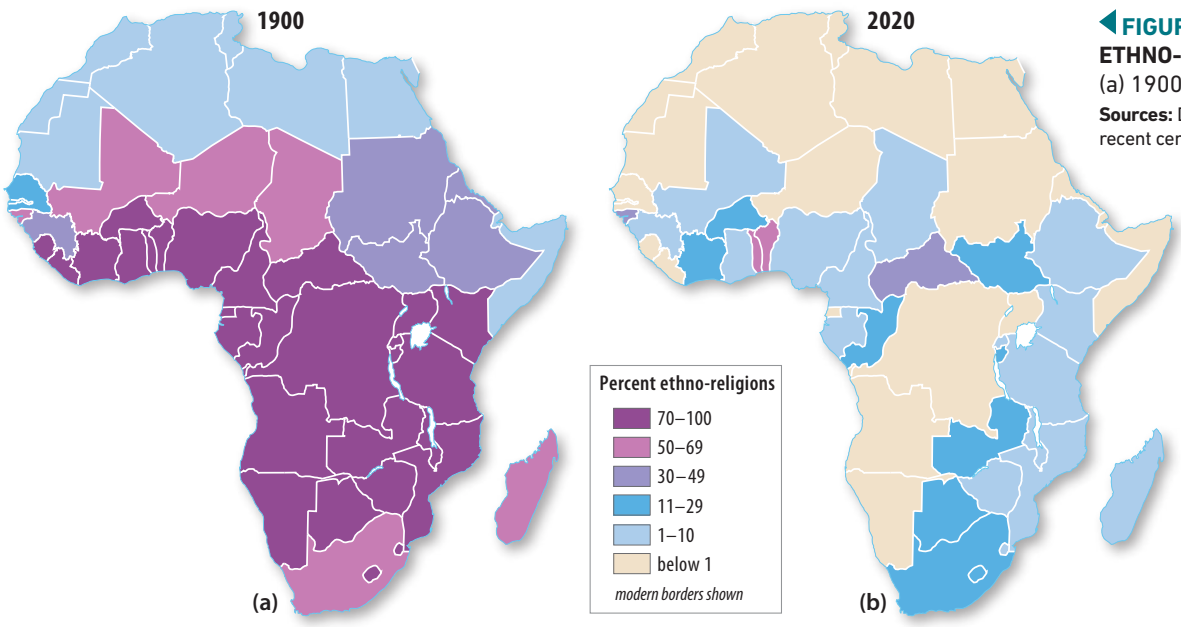
Chinese traditional religions are **syncretic**, which means they combine several traditions. Many Chinese people believe and practice folk religions in addition to or alongside the more formal religions. Adherence to Chinese folk religion is typically greater among the rural populations, whereas urban residents may adhere to Daoism or Confucianism (discussed in a later section). Practices may vary from one village to another and may be intermingled in a harmonious balance with the activities of the community's daily life, social relations, and politics.

Ethno-Religions in Africa

Less than 10 percent of Africans are estimated to follow ethno-religions. African ethno-religions are sometimes called **animism**. According to animism, elements of the natural world such as plants, stones, and events such as thunderstorms and earthquakes, are "animated," or have discrete spirits and conscious life.

Today sub-Saharan Africa is around 62 percent Christian – split about evenly among Roman Catholic, Protestant, and other – and around 31 percent Muslim. This distribution is in sharp contrast with the past. In 1900, more than 70 percent of Africans followed ethno-religions (Figure 6-16a). As recently as 1980, nearly one-half of Africans – around 200 million people – were still classified as ethno-religionists. The growth in the two universalizing religions at the expense of ethnic religions reflects fundamental geographic differences between the two types of religions. Remaining ethno-religionists in Africa are clustered primarily in a belt that separates predominantly Muslim North Africa from what has become predominantly Christian sub-Saharan Africa (Figure 6-16b).

▲ **FIGURE 6-15 CHINESE FOLK RELIGION** Lantern Festival, Shanghai, China.



◀ **FIGURE 6-16 DISTRIBUTION OF ETHNO-RELIGIONS IN AFRICA** (a) 1900 (b) 2020.

Sources: Decolonial Atlas (1900), Most recent census (2020)

Distribution of Other Religions

Learning Outcome 6.1.5 Describe the distribution of other established religions.

Nine religions are briefly described in this section in order of the estimated numbers of adherents. The adherents of eight of these nine religions are highly clustered in one or two countries (Figure 6-17). The exception is Bahá'í.

Religions with at Least 15 Million Adherents

Four religions, in addition to the universalizing and ethnic religions already discussed in this chapter, have at least 15 million adherents: New Religions, Sikhism, Spiritism, and Judaism.

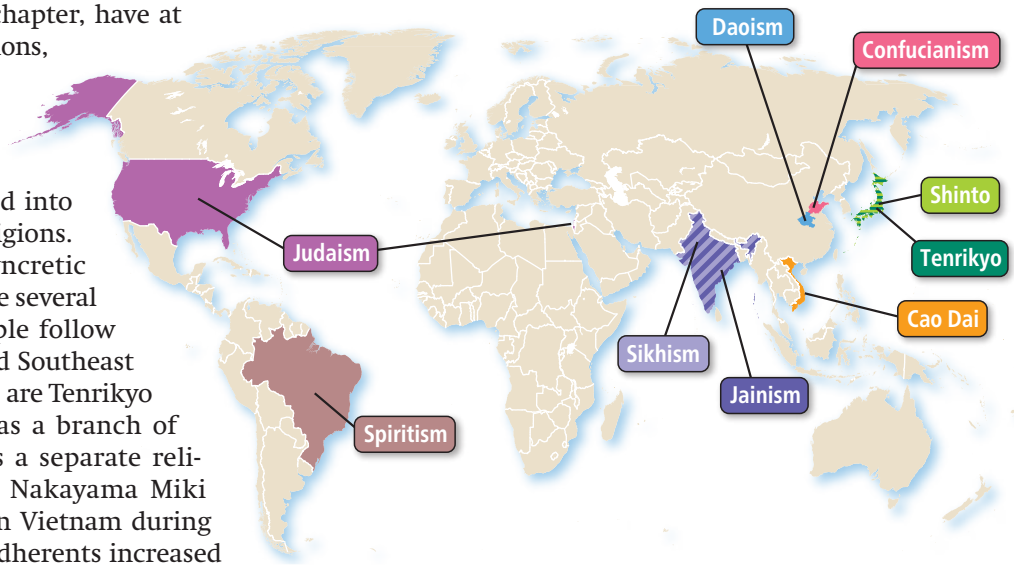
New Religions. Several religions created in the nineteenth and twentieth centuries are grouped into an umbrella designation of New Religions. New Religions are examples of syncretic religions, which means they combine several traditions. Around 66 million people follow New Religions, nearly all in East and Southeast Asia. Two examples of New Religions are Tenrikyo and Cao Dai. Originally regarded as a branch of Shinto, Tenrikyo was organized as a separate religion in 1854 by a woman named Nakayama Miki (1798–1887). Cao Dai was founded in Vietnam during the 1920s. The number of Cao Dai adherents increased after Vietnam's communist government granted the religion legal status in 1997.

Sikhism. All but 3 million of the world's 28 million Sikhs are clustered in the Punjab region of India. The founder of Sikhism, Guru Nanak (1469–1538), lived in a village near the city of Lahore, in present-day Pakistan. God was revealed to Nanak as The One Supreme Being, or Creator, who rules the universe by divine will. Nanak traveled widely through South Asia around 500 years ago, preaching his new faith, and his many followers became known as Sikhs (Punjabi for "disciples"). Nine other gurus succeeded Guru Nanak. In 1604, Arjan, the fifth guru, compiled and edited the Guru Granth Sa-hib (the Holy Granth of Enlightenment), which became the book of Sikh holy scriptures.

Spiritism. Spiritism is the belief that the human personality continues to exist after death and can communicate with the living through the agency of a medium or psychic. Most of the world's 15 million Spiritists reside in Brazil.

Judaism. Roughly two-fifths of the world's 15 million Jews live in the United States and another two-fifths in Israel. The name Judaism derives from Judah, one of the patriarch Jacob's 12 sons; Israel is another biblical name for Jacob. The Tanakh recounts the ancient history of the Jewish people and the laws of the Jewish faith (Figure 6-18). Tanakh is an acronym for Torah (also known as the *Five Books of Moses*), Nevi'im ("Prophets"), and Ketuvim ("Writings").

Judaism plays a more substantial role in Western civilization than its number of adherents would suggest. Judaism is the first recorded religion to espouse **monotheism**, which is belief that there is only one God. Fundamental to Judaism is belief in one all-powerful God. Judaism offered a sharp contrast to the **polytheism** practiced by neighboring people, who worshipped a collection of gods. The world's two most widely practiced religions – Christianity and Islam – find some of their roots in Judaism.



▲ **FIGURE 6-17 CLUSTERED RELIGIONS WITH AT LEAST 3 MILLION ADHERENTS**

▲ **FIGURE 6-18 JEWISH PRAYER SERVICE, SIX DOME SYNAGOGUE, QUBA, AZERBAIJAN**

Religions with Between 3 & 9 Million Adherents

Five religions have an estimated 3 to 9 million adherents. Daoism, Confucianism, and Bahá'í each have approximately 9 million adherents, Jainism has around 6 million, and Shintoism has around 3 million.

Daoism. Laozi (604–ca. 531 B.C.E., also spelled Lao-tzu) developed Daoism in ancient China. Although a Chinese government administrator by profession, Laozi's writings emphasized the mystical and magical aspects of life rather than the importance of public service, which Confucius had emphasized. Tao, which means "the way" or "the path," cannot be comprehended by reason and knowledge because not everything is knowable. It emphasizes the importance of studying nature to find one's place in the world instead of striving to change the world.

Confucianism. Confucius (551–479 B.C.E.) was a philosopher and teacher in the Chinese province of Lu. His sayings, which were recorded by his students, emphasized the importance of the ancient Chinese tradition of li, which can be translated roughly as "propriety" or "correct behavior." Confucianism prescribed a series of ethical principles for the orderly conduct of daily life in China, such as following traditions, fulfilling obligations, and treating others with sympathy and respect. These rules applied to China's rulers as well as to their subjects.

Bahá'í. Roughly equal numbers of Bahá'ís are found in India, other Asian countries, Africa, and the Western Hemisphere (Figure 6-19). A universalizing religion, Bahá'í was established in Shíráz, Iran, in 1844. It grew out of the Bábi faith, under the leadership of Siyyid 'Ali Muhammad, known as the Báb (Persian for "gateway"). Bahá'í provoked strong opposition from Shiite Muslims, and the Báb was executed in 1850, as were 20,000 of his followers. Bahá'ís believe that one of the Báb's disciples, Husayn 'Ali Nuri, known as Bahá'u'lláh (Arabic for "Glory of God"), was the prophet and messenger of God. Bahá'u'lláh's function was to overcome the disunity of religions and establish a universal faith through abolition of racial, class, and religious prejudices. Bahá'u'lláh was arrested and then exiled. In 1863, his claim that he was the messenger of God anticipated by the Báb was accepted by other followers. Before he died in 1892, Bahá'u'lláh appointed his eldest son, 'Abdu'l-Bahá (1844–1921), to be the leader of the Bahá'í community and the authorized interpreter of his teachings.

Jainism. Jainism originated in South Asia around 2,500 years ago. Its importance declined with the spread in importance of Buddhism and Hinduism in the region, especially since the eighth century C.E. Jains believe that nonviolence and self-control are the means to achieve liberation. India is the home to 95 percent of the world's 4 million Jains, although Jain centers are located in 25 of the 50 U.S. states (Figure 6-20).

▲ **FIGURE 6-19 BAHÁ'Í HOUSE OF WORSHIP** Delhi, India.

▲ **FIGURE 6-20 JAIN PILGRIMAGE SITE** Shri Sammed Shikharji, Jharkhand, India.

Shinto. Shinto, Japan's ethnic religion, is strongly rooted in the cultural history of the country. Japanese government statistics report around 89 million Shintos, or 70 percent of the country's population. However, in opinion polls only 4 million Japanese, or 3 percent of the population, identify themselves as Shinto. The large discrepancy stems in part from the fact that a seventeenth-century law in Japan assigns Shinto organizations with the task of maintaining records on Japanese citizens. The discrepancy also stems from the perception by some Japanese people that Shinto is a cultural feature rather than a religion.

Pause & Reflect 6.1.5 Most of the religions with at least 3 million adherents are clustered in which continent?

KEY ISSUE

6.2 | Why Do Religions Have Distinctive Distributions?

The current global and regional distributions of religions and their branches result from geographic processes of origin and diffusion. The most widely followed universalizing religions—Buddhism, Christianity, and Islam—have well-defined places of origin and widespread and well-documented patterns of diffusion. An ethnic religion such as Hinduism has contested origins and limited diffusion.

Origin of Christianity & Islam in Southwest Asia

Learning Outcome 6.2.1 Recount the origins of Christianity and Islam.

The two religions with the most adherents – Christianity and Islam – both originated in Southwest Asia. It is typical of universalizing religions such as Christianity and Islam that their places of origin are known and derived from events in the life of a specific person.

Origin of Christianity

Christianity was founded upon the teachings of Jesus, who was born in Bethlehem between 8 and 4 B.C.E. and died on a cross in Jerusalem about 30 C.E. Raised as a Jew, Jesus gathered a small group of disciples as well as a large group of followers and preached the coming of the Kingdom of God. The four Gospels of the Christian Bible – Matthew, Mark, Luke, and John – document miracles and extraordinary deeds that Jesus is believed to have performed. He was referred to as Christ, from the Greek word for the Hebrew word *messiah*, which means "anointed."

According to the Gospels, in the third year of his mission, Jesus was betrayed to the authorities by Judas Iscariot, one of the twelve disciples. After sharing the Last Supper (possibly the Jewish Passover Seder) with his disciples in Jerusalem, Jesus was arrested by the Romans and put to death as an agitator. On the third day after his death, his tomb was found empty (Figure 6-21). Christians believe that Jesus died to atone for human sins, that he was raised from the dead by God, and that his resurrection from the dead provides people with hope for salvation.

Roman Catholic Branch. Roman Catholics accept the teachings of the Bible as well as the interpretation of those teachings by the church hierarchy, headed by the pope. Roman Catholics recognize the pope as possessing a universal primacy or authority, and they believe that the pope is infallible in resolving theological disputes. According to Roman Catholic belief, God conveys grace directly to humanity through seven sacraments: Baptism, the Eucharist (the partaking of bread and wine that repeats the actions of Jesus at the Last Supper), Penance, Confirmation, Matrimony, Holy Orders, and Anointing the Sick.

Orthodox Branch. Orthodoxy comprises the faith and practices of a collection of churches that arose in the eastern part of the Roman Empire. The split between the Roman and Eastern churches dates to the fifth century, a result of rivalry between the Pope of Rome and the Patriarchy of Constantinople, which was especially intense after the collapse of the western Roman Empire. The split between the two churches became final in 1054, when Pope Leo IX condemned the Patriarch of Constantinople. Orthodox Christians accept the seven sacraments but reject doctrines that the Roman Catholic Church has added since the eighth century.

Protestant Branch. Protestantism originated with the principles of the Reformation in the sixteenth century. The Reformation movement is regarded as beginning when Martin Luther (1483–1546) posted 95 theses on the door of the church at Wittenberg on October 31, 1517. According to Luther, individuals have primary responsibility for achieving personal salvation through direct communication with God. Grace is achieved through faith rather than through sacraments performed by the Church.

▲ **FIGURE 6-21 ORIGIN OF CHRISTIANITY** The tomb (known as the Edicule) inside the Church of the Holy Sepulchre in Jerusalem was erected at the place where Christians accept that Jesus was buried and resurrected.

Origin of Islam

Like other universalizing religions, Islam arose from the teachings of a historical founder. The core of Islamic belief involves performing five acts, known as the Five Pillars of Islam:

1. Shahada (profession of faith). Muslims frequently recite their belief that there is no deity worthy of worship except the one God, the source of all creation, as well as their belief that Muhammad is the messenger of God.
2. Salat (prayer). Five times daily, Muslims pray facing the city of Makkah (Mecca), as a direct link to God.
3. Zakat (charity). Muslims give generously to charity as an act of purification and growth.
4. Sawm (fasting). Muslims fast during the month of Ramadan as an act of self-purification.
5. Hajj (pilgrimage). If physically and financially able, Muslims make a pilgrimage to Makkah.

Islam traces its origin to the same narrative as Judaism and Christianity. All three religions consider Adam to have been the first man and Abraham to have been one of his descendants. According to the Jewish Torah and Christian Old Testament, Abraham married Sarah, who did not bear children. As polygamy (having more than one wife) was a custom of the culture, Abraham then married Hagar, who bore a son, Ishmael. Sarah was later able to conceive, and she bore a son, Isaac.

Jews and Christians trace their story through Abraham's original wife Sarah and her son Isaac. Muslims trace their story through his second wife, Hagar, and her son Ishmael. The Islamic tradition tells that Abraham brought Hagar and Ishmael to Makkah, in present-day Saudi Arabia. Centuries later, according to the Islamic narrative, one of Ishmael's descendants, Muhammad, became the Prophet of Islam.

Muhammad, the Prophet of Islam. Muhammad was born in Makkah about 570 C.E. At age 40, while engaged in a meditative retreat, Muhammad is believed by Muslims to have received his first revelation from God through the angel Gabriel. The Quran, the holiest book in Islam, is accepted by Muslims to be a record of God's words, as revealed to the Prophet Muhammad through Gabriel. Arabic is a lingua franca, or language of communication, within the Islamic world in part because it is the language in which the Quran is written.

Islam teaches that as he began to preach the truth that God had revealed to him, Muhammad and his followers suffered persecution, and in 622, he was commanded by God to emigrate. His migration from Makkah to the city of Yathrib – an event known as the Hijrah (from the Arabic word for "migration," sometimes spelled hegira) – marks the beginning of the Islamic calendar. Yathrib was subsequently renamed Madinah, Arabic for "the City" (Figure 6-22). After several years, Muhammad and his followers returned to Makkah and established Islam as the city's religion. By Muhammad's death in 632, when he was about age 63, Islam had spread through most of present-day Saudi Arabia.

Pause & Reflect 6.2.1 What demographic factors discussed in Chapter 2 would help explain why worldwide the number of Muslims is increasing more rapidly than the number of Christians?

Shiite and Sunni Branches. Differences between the two main branches of Islam – Shiite and Sunni – go back to the earliest days of the religion and reflect disagreement over the line of succession in Islamic leadership. Muhammad had no surviving son and no agreed-upon successor. By default upon his death, Muhammad's successor was his father-in-law, Abu Bakr (573–634), an early supporter from Makkah, who became known as caliph ("successor of the prophet"). The next two caliphs, Umar (585–644) and Uthman (ca. 579–656), expanded the territory under Islamic influence to Egypt and Persia.

Uthman was a member of a powerful Makkah clan that had initially opposed Muhammad before the clan's conversion to Islam. The more ardent converts criticized Uthman for seeking compromises with other families in Makkah. Uthman's opponents found a leader in Ali (ca. 600–661), a cousin and son-in-law of Muhammad, and thus Muhammad's nearest male heir. When Uthman was murdered, in 656, Ali became caliph, although five years later he, too, was assassinated.

Ali's descendants claim leadership of Islam and Shiites support this claim. But Shiites disagree among themselves about the precise line of succession from Ali to modern times. They acknowledge that the chain of leadership was broken, but they dispute the date and events surrounding the disruption.

FIGURE 6-22 ORIGIN OF ISLAM Muslims pray outside Al-Masjid an-Nabawī (Prophet's Mosque), in Madinah, Saudi Arabia. Muhammad is buried under the green dome.

Origin of Buddhism & Hinduism in South Asia

Learning Outcome 6.2.2 Discuss the origin of Buddhism and the reason the origin of Hinduism is unknown.

Buddhism, like other universalizing religions, has a precise place of origin, based on events in the life of a man. Ethnic religions such as Hinduism have unknown or unclear origins, not tied to single historical individuals.

Origin of Buddhism

The founder of Buddhism, Siddhartha Gautama, was born about 563 B.C.E. in Lumbinī, in present-day Nepal, near the border with India. The son of a lord, he led a privileged existence, sheltered from life's hardships. Gautama had a beautiful wife, palaces, and servants.

According to Buddhist tradition, Gautama's life changed after a series of four trips. He encountered a decrepit old man on the first trip, a disease-ridden man on the second trip, and a corpse on the third trip. After witnessing these scenes of pain and suffering, Gautama began to feel he could no longer enjoy his life of comfort. On a fourth trip, Gautama saw a monk, who taught him about withdrawal from the world. At age 29 Gautama left his palace one night and lived in a forest for the next 6 years, thinking and experimenting with forms of meditation (Figure 6-23). Gautama emerged as the Buddha, the "awakened or enlightened one," and spent 45 years preaching his views across India. In the process, he trained monks, established orders, and preached to the public.

The foundation of Buddhism is represented by these concepts, known as the Four Noble Truths:

1. All living beings must endure suffering.
2. Suffering, which is caused by a desire to live, leads to reincarnation (repeated rebirth in new bodies or forms of life).
3. The goal of all existence is to escape suffering and the endless cycle of reincarnation into Nirvana (a state of complete redemption), which is achieved through mental and moral self-purification.
4. Nirvana is attained through an Eightfold Path: rightness of belief, resolve, speech, action, livelihood, effort, thought, and meditation.

Theravada Buddhism Theravada is the older of the two largest branches of Buddhism. The word *theravada* means "the way of the elders," indicating the Theravada Buddhists' belief that their approach is closer to Buddha's original approach. Theravadists believe that Buddhism is a full-time occupation, so to become a good Buddhist, one must renounce worldly goods and become a monk.

Mahayana Buddhism. Mahayana split from Theravada Buddhism about 2,000 years ago. Mahayana is translated as "the great vehicle," and Mahayanists call Theravada Buddhism by the name Hinayana, or "the lesser vehicle." Mahayanists claim that their approach to Buddhism can help more people because it is less demanding and all-encompassing. Theravadists emphasize Buddha's life of self-help and years of solitary introspection, and Mahayanists emphasize Buddha's later years of teaching and helping others. Theravadists cite Buddha's wisdom, and Mahayanists emphasize his compassion.

Vajrayana Buddhism. Vajrayanas emphasize the practice of rituals, known as tantras, which have been recorded in texts. Vajrayanas believe that Buddha began to practice tantras during his lifetime, although other Buddhists regard Vajrayana as an approach to Buddhism that evolved from Mahayana Buddhism several centuries later.

▲ **FIGURE 6-23 ORIGIN OF BUDDHISM** Mahabodhi (Great Awakening) Temple was built in Bodh Gaya, the site in present-day India where Siddhartha Gautama attained enlightenment as the Buddha.

Unknown Origin of Hinduism

As an ethnic religion based in India, Hinduism has unknown origins. The word *Hinduism* originated in the sixth century B.C.E. to refer to people living in what is now India, but religious practices existed prior to recorded history. Elements of Hinduism may have originated in the Indus Valley civilization, which flourished between approximately 2500 B.C.E. and 1500 B.C.E. in the valley along the Indus River in present-day eastern Pakistan. Archaeological evidence of possible rituals from that era includes bathing rituals (Figure 6-24), animal sacrifices, and sculptures that may depict Hindu gods.

Aryan tribes from Central Asia invaded South Asia about 1400 B.C.E. and brought with them Indo-European languages, as discussed in Chapter 5. In addition to their language, the Aryans brought their religion. The Aryans first settled in the area now called the Punjab in northwestern India and later migrated east to the Ganges River valley, as far as Bengal. Centuries of intermingling with the Dravidians already living in the area modified their religious beliefs.

The earliest surviving Hindu texts, known as Vedas, were written around 1100 B.C.E. Some rituals from this era survive in contemporary Hinduism, including worship of various gods representing Earth, atmosphere, and sky. By around 2,000 years ago, key texts were composed, and rituals were developed that remain central to contemporary Hinduism. The earliest surviving Hindu temples were constructed between 1,500 and 2,000 years ago (Figure 6-25).

FIGURE 6-24 BATHING IN THE GANGES Hindus bathe in the Ganges River to wash away their sins.

FIGURE 6-25 EARLY HINDU TEMPLE Dashavatara Temple, in Deogarh, India, is one of the oldest surviving Hindu temples. It was built around 500 C.E. and was dedicated to Lord Vishnu.

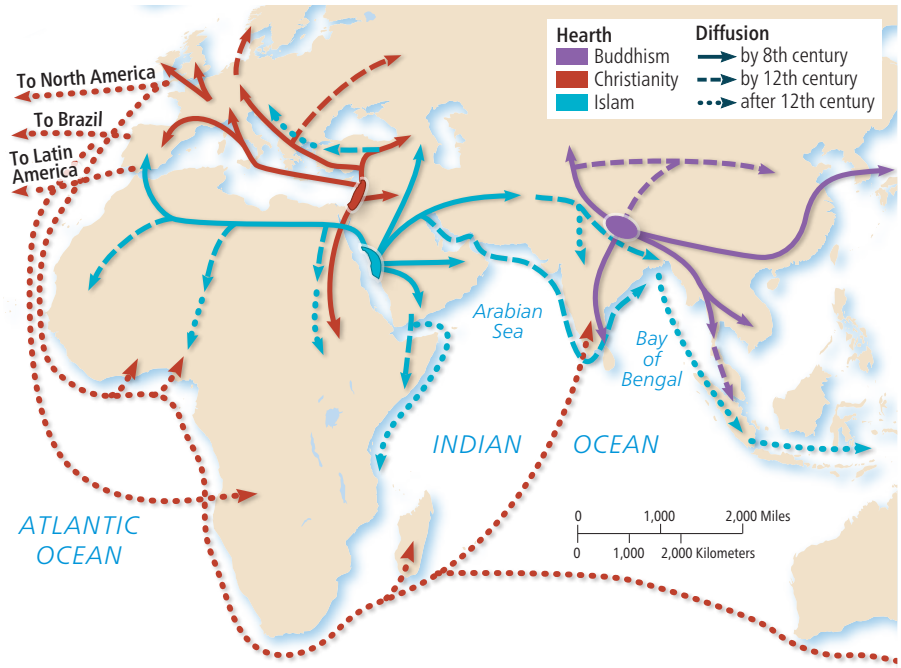
Pause & Reflect 6.2.2 Rank the origins of the four largest religions from earliest to most recent.

Historical Diffusion of Religions

Learning Outcome 6.2.3 Analyze the process of diffusion of universalizing religions.

The universalizing religions have diffused from specific hearths, or places of origin, to other regions of the world. In contrast, most ethnic religions have typically remained clustered. The hearths where each of the three largest universalizing religions originated are based on the events in the lives of the three key individuals. All three hearths are in Asia (Christianity and Islam in Southwest Asia and Buddhism in South Asia). Followers transmitted the messages preached in the hearths to people elsewhere, diffusing them across Earth's surface along distinctive paths, as shown in Figure 6-26.

Ethnic religions can diffuse if adherents migrate to new locations for economic reasons and are not forced to adopt a strongly entrenched religion. For example, the 1.3 million inhabitants of Mauritius include 48 percent who are Hindu. Hinduism was brought to Mauritius by immigrants from India who were employed in sugar fields owned by European settlers.

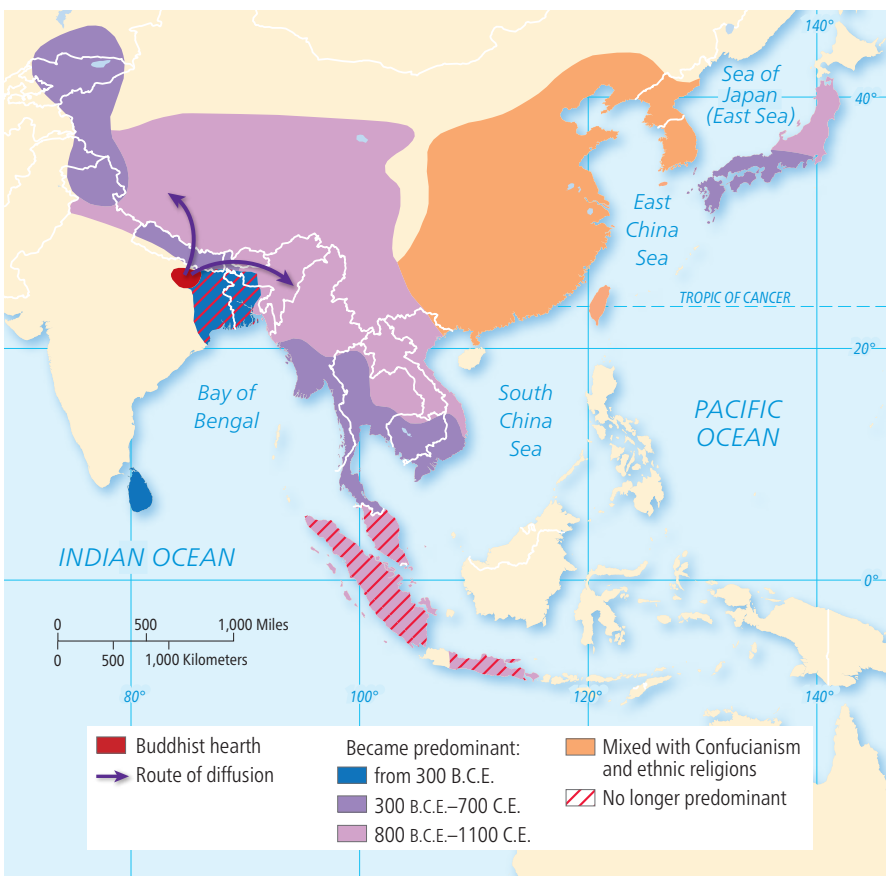


▲ **FIGURE 6-26 DIFFUSION OF UNIVERSALIZING RELIGIONS**

Diffusion of Buddhism

Buddhism did not diffuse rapidly from its point of origin in northeastern India. Responsible for much of the early diffusion of Buddhism was Ashoka, emperor of the Magadha Empire from about 268 to 232 B.C.E. The Magadha Empire formed the nucleus of several powerful kingdoms in South Asia between the sixth century B.C.E. and the eighth century C.E. Around 257 B.C.E., Ashoka became a Buddhist and attempted to put into practice Buddha's social principles.

In the first century C.E., merchants along the trading routes from northeastern India introduced Buddhism to China. Many Chinese were receptive to the ideas brought by Buddhist missionaries, and Buddhist texts were translated into Chinese languages. Chinese rulers allowed their people to become Buddhist monks during the fourth century C.E., and in the following centuries Buddhism turned into a genuinely Chinese religion. Buddhism further diffused from China to Korea in the fourth century and from Korea to Japan two centuries later. During the same era, Buddhism lost its original base of support in India although Sri Lanka remains partially Buddhist (Figure 6-27).

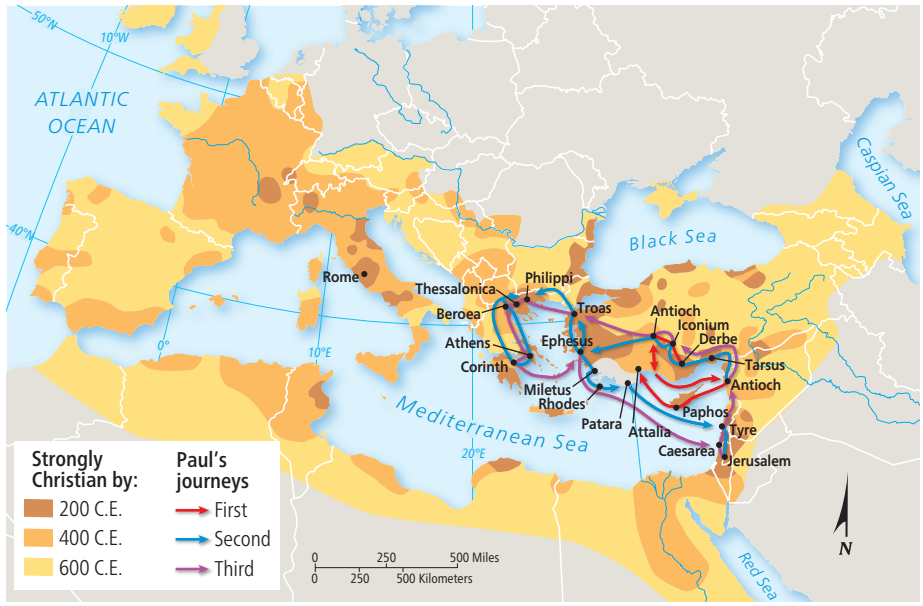


◀ **FIGURE 6-27 DIFFUSION OF BUDDHISM**

Diffusion of Christianity

Christianity's diffusion has been rather clearly recorded since the time of Jesus in the Roman province known at the time as Judea. Consequently, geographers can examine its diffusion by reconstructing patterns of communications, interaction, and migration. Christianity diffused through a combination of relocation diffusion and expansion diffusion (refer to Chapter 1).

Relocation Diffusion of Christianity. Christianity first spread from its hearth in Judea through relocation diffusion. **Missionaries** – individuals who help transmit a universalizing religion through relocation diffusion – carried the teachings of Jesus along the Roman Empire's protected sea routes and excellent road network to people in other locations (Figure 6-28). People in commercial towns and military settlements that were directly linked by the communications network received the message of Christianity first from Paul and other missionaries.



▲ **FIGURE 6-28 DIFFUSION OF CHRISTIANITY** Christianity began to diffuse throughout Europe during the time of the Roman Empire and continued after the empire's collapse. Paul of Tarsus, a disciple of Jesus, traveled through the eastern Roman Empire as a missionary.

Expansion Diffusion of Christianity. The dominance of Christianity throughout the Roman Empire was assured during the fourth century through the two types of expansion diffusion:

- **Hierarchical diffusion.** The spread of Christianity was encouraged when the Roman Empire's key elite figure, Emperor Constantine (272–337 C.E.), embraced the religion in 313 C.E., and Emperor Theodosius proclaimed it the empire's official religion in 380 C.E. In subsequent centuries, Christianity further diffused into Eastern Europe through conversion of kings or other elite figures.
- **Contagious diffusion.** Christianity spread widely within the Roman Empire in part through contagious diffusion – daily contact between believers in the towns and nonbelievers in the surrounding countryside. Since 1500 C.E., contagious diffusion has extended Christianity around the world, especially through contact between European Christians and indigenous peoples in the Americas, Africa, and South Pacific.

▲ **FIGURE 6-29 DIFFUSION OF ISLAM** Islam diffused rapidly from its point of origin in present-day Saudi Arabia. Within 200 years, Muslims controlled much of Southwest Asia & North Africa as well as southwestern Europe.

Diffusion of Islam

Muhammad's successors organized followers who extended Islamic control over an extensive area of Africa, Asia, and Europe through military conquest (Figure 6-29). Within a century of Muhammad's death, Muslims controlled Palestine, the Persian Empire, and much of India, resulting in the conversion of many non-Arabs to Islam, often through intermarriage.

To the west, Muslims diffused across North Africa, crossed the Strait of Gibraltar, and retained much of present-day Spain, until 1492. During the same century in which the Christians regained all of Western Europe, Muslims took control of much of southeastern Europe and Türkiye.

Pause & Reflect 6.2.3 Does the diffusion of Islam provide a good example of hierarchical diffusion, relocation diffusion, or both?

Recent Migration Patterns of Religious Groups

Learning Outcome 6.2.4 Trace the distinctive migration patterns of Jews and Muslims.

The religious composition of international migrants does not match the overall share of adherents of various religions. Christians comprise only one-third of the world's population but account for one-half of the world's international migrants. Muslims and Jews also comprise higher percentages of the world's migrants than their shares of the world's population. Buddhists, Hindus, folk religionists, and unaffiliated people are less likely to migrate (Figure 6-30).

According to the Pew Research Center, Jews are much more likely to migrate internationally than their share of the world's population would suggest. Around 25 percent of all Jews have migrated from one country to another at some point in their lives. Only 4 percent of all people alive today have migrated internationally. Among the more numerous religious groups, around 5 percent of all Christians and 4 percent of all Muslims have migrated, compared to only 1 or 2 percent of other religious groups (Figure 6-31).

Migration Patterns of Jews

Today, Israel is the destination for 73 percent of Jews who migrate internationally. As the world's only state with a Jewish majority, Israel offers an especially strong pull factor for Jewish migrants. Presently, the United States is the destination for 10 percent of Jewish international migrants and Canada for 4 percent.

In the modern period, only since the creation of the State of Israel in 1948 has a significant percentage of the world's Jews lived there. Jews trace their origins as a people to the land of Israel and King David's establishment of the Kingdom of Israel around 3,000 years ago. Most Jews have not lived there since 70 C.E., when the Romans forced them to disperse throughout the world, an action known as the diaspora, from the Greek word for "dispersion." Many Jews migrated from the eastern Mediterranean to Europe, where they lived among other nationalities, retaining separate religious practices but adopting other cultural characteristics of the host country, such as language.

Other nationalities often persecuted the Jews living in their midst. Historically, the Jews of many European countries were forced to live permanently in **ghettos** (areas in cities set up by law to be inhabited only by Jews). The term *ghetto* originated in Venice, Italy, as a reference to the city's former copper foundry or metal-casting district, where Jews were forced to live. Ghettos were frequently surrounded by walls, and gates were locked at night to prevent escape. Persecution and rising nationalist movements in Europe sparked the growth of Jewish nationalism, known as Zionism. This led to increased Jewish migration to the land of Israel (then under Ottoman rule) in the late nineteenth and early twentieth centuries.

During the Holocaust (1939–1945), the Nazis systematically murdered 6 million Jews, about two-thirds of the Jews of Europe. After its establishment in 1948, the State of Israel absorbed several hundred thousand Jewish refugees from Europe as well as from Southwest Asia & North Africa. Today, fewer than 10 percent of the world's 15 million Jews live in Europe, compared to 81 percent in 1900 (Figure 6-32).

Pause & Reflect 6.2.4 What country had the largest Jewish population in 1900?

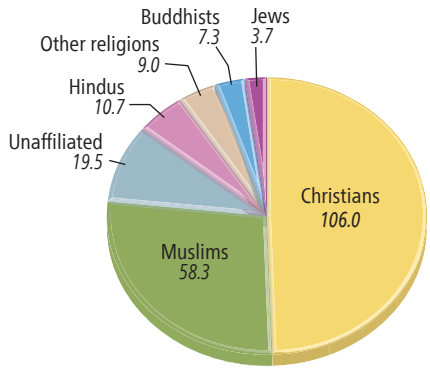


FIGURE 6-30 RELIGION OF INTERNATIONAL MIGRANTS Figures are in millions of people. Compare to Figure 6-1. Christians comprise less than one-third of the world's population but around one-half of international migrants.

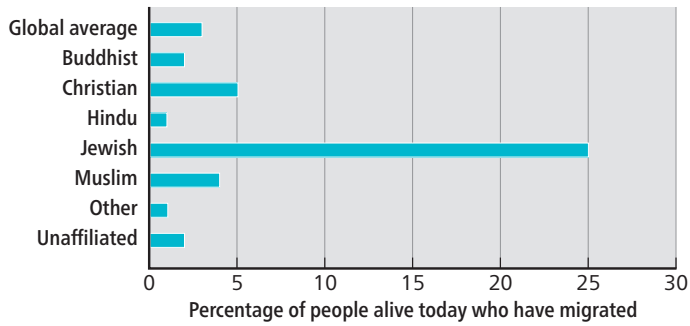


FIGURE 6-31 PERCENTAGE OF PEOPLE ALIVE TODAY WHO HAVE MIGRATED BY RELIGION

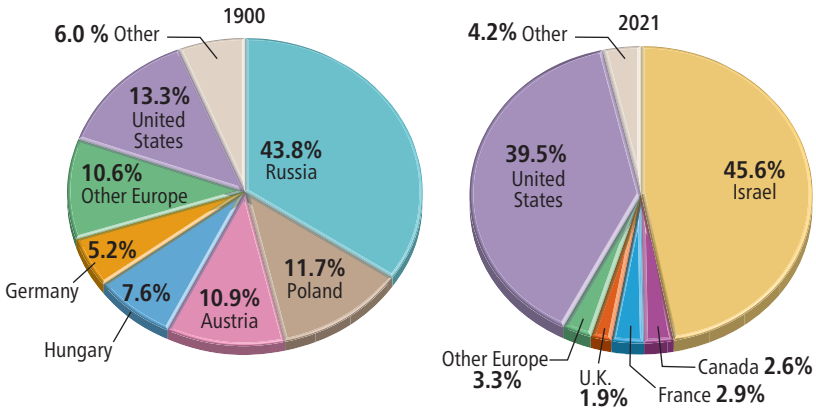


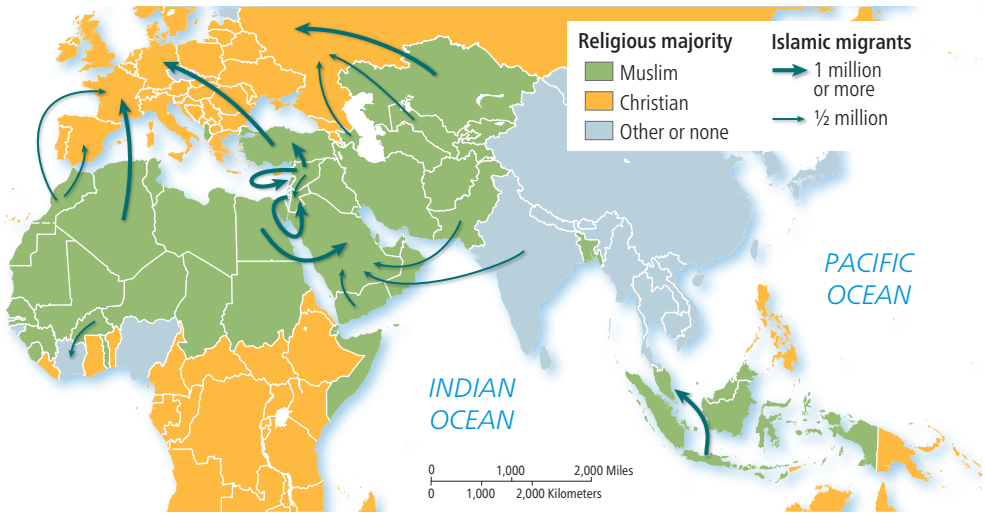
FIGURE 6-32 DISTRIBUTION OF JEWS, 1900 AND 2021 (a) In 1900, most Jews lived in Europe (including Russia). (b) Now, most Jews live in Israel or the United States.

Migration Patterns of Muslims

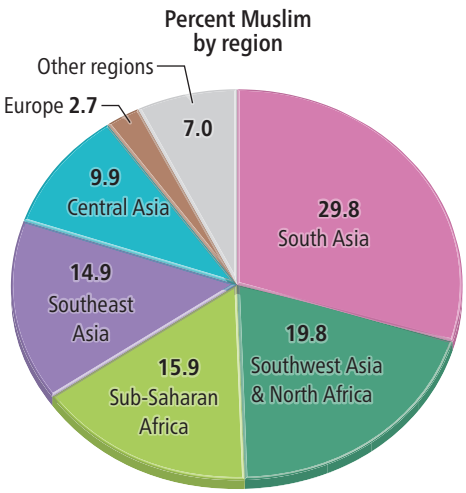
Currently, Southwest Asia & North Africa is home to 20 percent of the world's Muslims but attracts 34 percent of Islamic migrants. Saudi Arabia is the country that attracts the largest number of Islamic migrants, accounting for 10 percent of the world total. Egypt sends the largest number of migrants to Saudi Arabia (Figure 6-33).

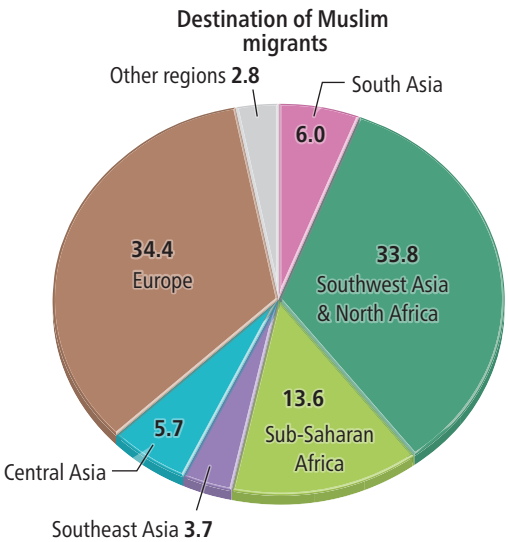
Europe, with around 3 percent of the world's Muslims, attracts 34 percent of Muslims who migrate internationally (Figure 6-34). Russia, Germany, and France are all world leaders in attracting Muslims. The largest numbers of Muslims who have migrated to Europe have come from Türkiye to Germany and from Algeria to France. Morocco has been the source of a large number of Islamic migrants to France and Spain (Figure 6-35). North America receives only around 1 percent of Muslim migrants.

On the other hand, South Asia, with around 30 percent of the world's Muslims, attracts only 6 percent of the migrants. Central Asia and Southeast Asia also attract fewer migrants than their share of the world's Islamic population. The four countries with the largest Islamic populations – Indonesia, Pakistan, Bangladesh, and India – are home to 43 percent of the world's Muslims but attract only 6 percent of Islamic migrants.



▲ **FIGURE 6-33 LARGEST FLOWS OF ISLAMIC MIGRANTS**
Source: Pew Research Center



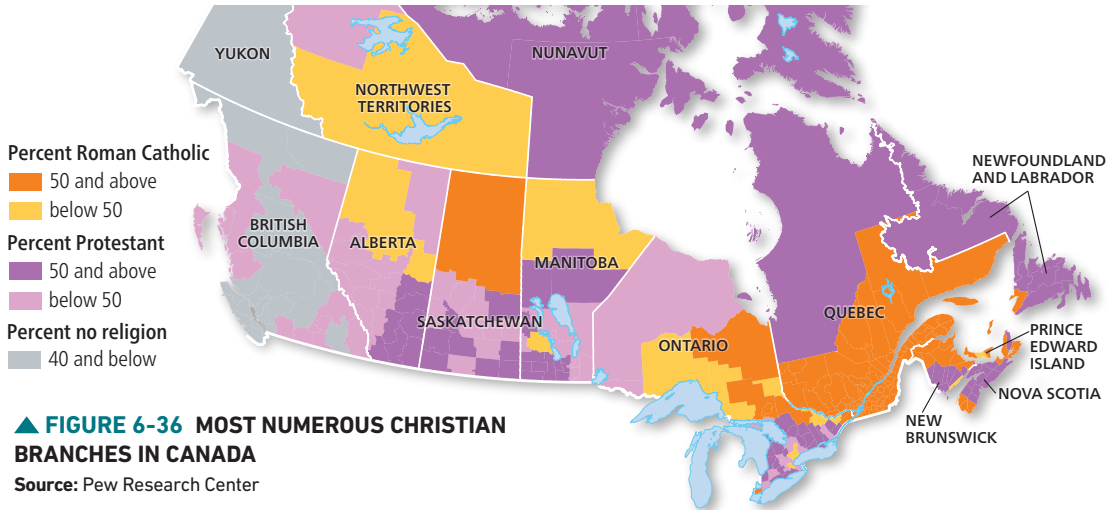


▲ **FIGURE 6-34 DESTINATION OF ISLAMIC MIGRANTS BY REGION**
Source: Pew Research Center

▲ **FIGURE 6-35 MUSLIMS IN EUROPE** Muslims pray in the street in the Goutte d'Or neighborhood of Paris because the local mosque isn't large enough to accommodate everyone who wants to pray.

Recent Migration of Christians

Learning Outcome 6.2.5
Describe the distinctive migration patterns of Christian groups in modern times.



▲ **FIGURE 6-36 MOST NUMEROUS CHRISTIAN BRANCHES IN CANADA**
Source: Pew Research Center

The distribution of Christians is being altered by migration in modern times. North America has been the destination for a large number of Christians.

Immigration of Christians to North America

Most immigrants to the United States are Christians. In 2012, approximately 61 percent of immigrants were Christian, according to Pew Research Center. Muslims comprised 10 percent of immigrants to the United States, Hindus 7 percent, Buddhists 6 percent, other religions 3 percent, and unaffiliated 14 percent. Unauthorized immigrants to the United States were 83 percent Christian, 7 percent other religions, and 9 percent unaffiliated. The percentage of immigrants to the United States who are Christians declined from 68 percent in 1992 to 61 percent in 2012. The decline has been offset by increases in the percentage who are Muslims and Hindus.

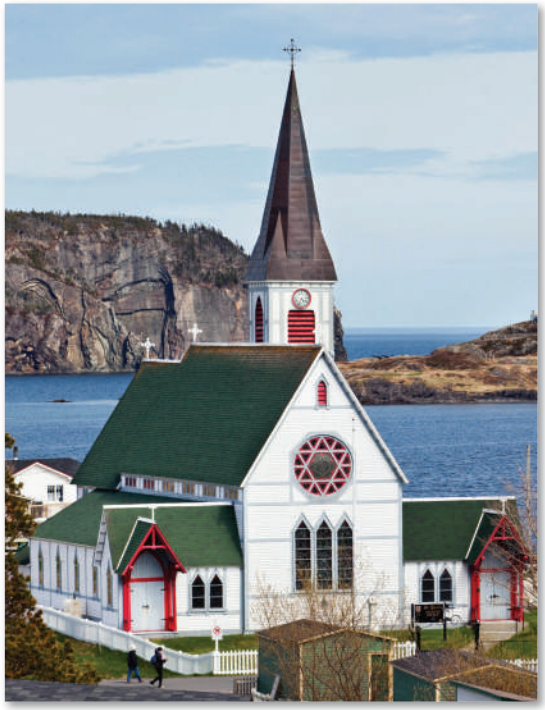
As in the United States, the percentage of Christian immigrants to Canada declined from 88 percent in 1971 to 66 percent in 2011. Most of the increase has been in people unaffiliated with religions (Figure 6-36).

Canada (except Québec) and the United States have Protestant majorities because their early colonists came primarily from Protestant England (Figure 6-37). Some regions and localities within the United States and Canada are predominantly Roman Catholic because of immigration from Roman Catholic dominant countries. Immigration from Mexico and other Latin American countries has concentrated Roman Catholics in the U.S. Southwest, whereas French settlement from the seventeenth century as well as recent immigration has produced a predominantly Roman Catholic Québec (Figure 6-38). Similarly, geographers trace the distribution of other Christian denominations within the United States to the fact that migrants came from different parts of Europe, especially during the nineteenth century.

The Church of Jesus Christ of Latter-day Saints, popularly known as Mormons, is an example of a Christian faith that originated in the United States. The group settled at Fayette, New York, near the hometown of their founder Joseph Smith. During Smith's life, the group moved several times in search of religious freedom. Eventually, under the leadership of Brigham Young, they migrated to then sparsely inhabited Salt Lake Valley in the present-day state of Utah.

The distribution of Christian branches in Canada is also a function of migration. Roman Catholics form a majority in Québec, a legacy of its settlement by French migrants in the seventeenth century. Protestants form a majority in ther provinces, especially as a result of westward migration from Ontario.

▼ **FIGURE 6-37 PROTESTANTS IN CANADA**
St. Paul's Anglican Church, Trinity, Newfoundland.



▼ **FIGURE 6-38 ROMAN CATHOLICS IN CANADA**
Cathedral-Basilica of Notre-Dame de Québec, Québec City, Canada.

Global Migration Patterns of Christians

The destinations of international migrants who are Christian do not match the distribution of Christians (Figure 6-39). North America is home to 12 percent of the world's Christians but is the destination for 34 percent of migrating Christians, including 30 percent entering the United States and 4 percent entering Canada (Figure 6-40). Europe is home to nearly 26 percent of the world's Christians but is the destination for almost 38 percent of migrating Christians. On the other hand, Latin America and sub-Saharan Africa attract relatively few Christian migrants compared to the share of the world's Christians living in those two regions. The largest migration flows of Christians are in and out of Russia and into the United States (Figure 6-41).

Pause & Reflect 6.2.5 Based on religious preference, which two provinces of Canada appear to have the largest number of migrants from Québec?

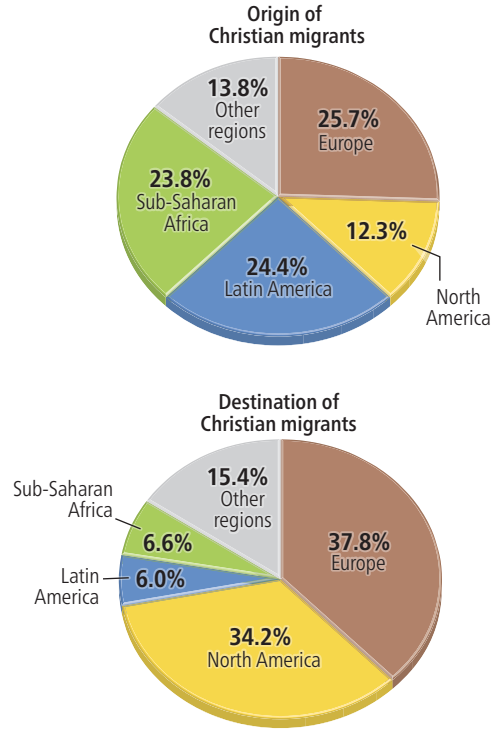


FIGURE 6-39 ORIGIN AND DESTINATION OF CHRISTIAN MIGRANTS BY REGION

FIGURE 6-40 ORTHODOX CHURCH IN CANADA St. Nedela Macedonian Orthodox Church, Ajax, Ontario.

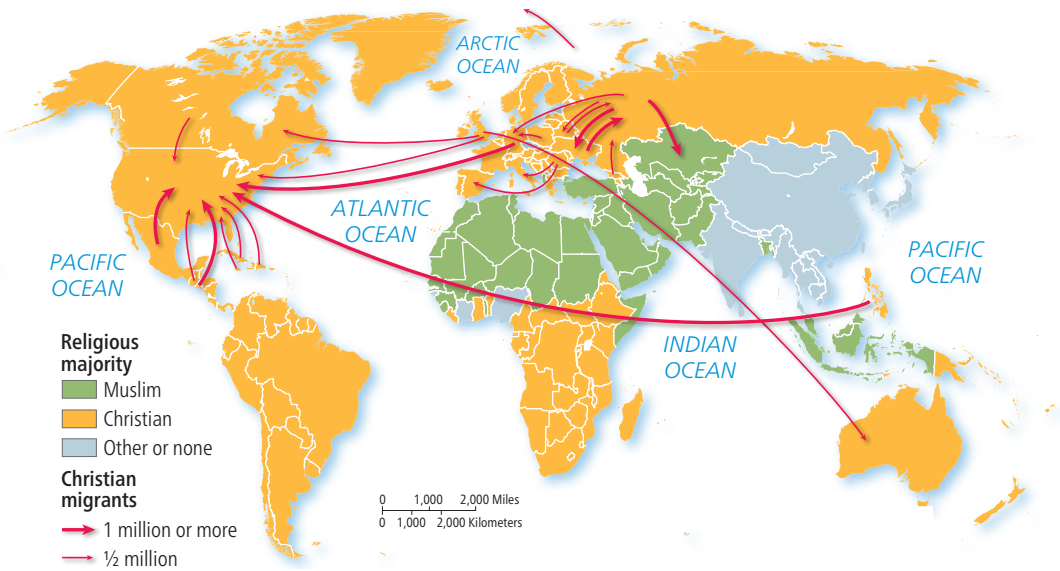


FIGURE 6-41 MIGRATION OF CHRISTIANS BY LARGEST FLOWS
Source: Pew Research Center

KEY ISSUE

6.3 | Why Do Religions Organize Space in Specific Patterns?

Geographers study the ways in which religious beliefs and practices can have a significant impact on the landscape through the organization of space and people. The distribution of religions and their activities across the Earth are a reflection of people's values and identity, as many religious people believe that their life on Earth ought to be spent in service to God.

The impact of religion is clearly seen in the arrangement of human activities on the landscape at several scales, from relatively small parcels of land to entire communities. How each religion distributes its elements on the landscape depends on its beliefs.

Places of Worship

Learning Outcome 6.3.1 Describe places of worship in various religions.

In large cities and small villages around the world, regardless of the region's prevailing religion, the tallest, most elaborate buildings are often religious structures. Sacred structures are physical "anchors" of religion. Some structures are designed for a group to gather, whereas others are intended for individual meditation.

Christian & Islamic Structures

Church, basilica, mosque, temple, and *synagogue* are familiar words that identify places for collective religious expression in various religions. They share the feature of being places where people come together for prayer.

Christian Churches. The Christian landscape is dominated by a high density of churches. The church is an expression of religious principles, an environment in the image of God. The word *church* derives from a Greek term meaning "lord," "master," and "power." Church also refers to a gathering of believers as well as the building at which the gathering occurs.

The church is relatively prominent in Christianity in part because attendance at a collective service of worship is considered extremely important by all three major Christian branches. The prominence of churches on the landscape also stems from their style of construction and location. In some communities, the church was traditionally the largest and tallest building and was placed at an important square or other prominent location. Although such characteristics may no longer apply in large cities, they are frequently still true for small towns and neighborhoods within cities.

Since Christianity split into many denominations, no single style of church construction has dominated. Churches reflect both the cultural values of the denomination and the region's architectural heritage. Orthodox churches follow an architectural style that developed in the Byzantine Empire during the fifth century. Byzantine-style Orthodox churches tend to be highly ornate, topped by prominent domes (refer to Figure 6-40). Many Protestant churches in North America, on the other hand, are simple, with little ornamentation (refer to Figure 6-37). This austerity is a reflection of the Protestant conception of a church as an assembly hall for preaching to the congregation.

Availability of building materials also influences church appearance. In the United States, early churches were most frequently built of wood in the Northeast, brick in the Southeast, and adobe in the Southwest. Stucco and stone predominated in Latin America. This diversity reflected differences in the most common building materials found by early settlers.

Islamic Mosques. The word *mosque* derives from the Arabic for "place of worship." Muslims consider a mosque to be a location for the community to gather together for worship. Mosques are found primarily in larger cities of the Islamic world; simple structures may serve as places of prayer in rural villages.

A mosque is organized around a central courtyard—traditionally open-air, although it may be enclosed in harsher climates (Figure 6-42). The pulpit is placed at the end of the courtyard facing Makkah, the direction toward which all Muslims pray. Surrounding the courtyard is a cloister used for schools and nonreligious activities. A distinctive feature of the mosque is the minaret, a tower where a man known as a muezzin summons people to worship (refer to Figure 6-22).

▲ **FIGURE 6-42 MOSQUE COURTYARD** Çamlica Mosque, Istanbul, the largest mosque in Türkiye.

Places of Worship in Other Religions

For some of the religions that are less numerous than Christianity and Islam, places of worship are important centers for worship. In other religions, a structure may serve as a place of reflection for an individual or a small group.

Sikh Gurdwara. Sikhs come together for worship at a gurdwara. The most important gurdwara is the Harmandir Sahib, or Golden Temple, in Amritsar, India (Figure 6-43). The Golden Temple houses Sikhism's holiest book, the Guru Granth Sahib. Most gurdwaras imitate the layout of the Golden Temple. A gurdwara is identified by the Sikh flag flying from a tall flagpole.

Jewish Synagogues. The word *synagogue* derives from the Greek word for "assembly." The synagogue is a building often referred to by the Yiddish word *shul*, similar to the German word for "school." As these words suggest, a synagogue is a place for study and public assembly as well as for prayer (refer to Figure 6-18). The origin of the synagogue is unknown; it possibly came to be during the sixth century B.C.E., when Jews were living in exile in Babylonia, after the destruction of the First Temple in 586 B.C.E. Synagogues took on more importance as the place for communal prayer after the destruction of the Second Temple in 70 C.E.

Bahá'í Houses of Worship. Bahá'ís have built Houses of Worship in every continent to dramatize that Bahá'í is a universalizing religion with adherents all over the world. Houses of Worship known as Mother Temples have been dedicated in Wilmette, Illinois, in 1953; Sydney, Australia, in 1961; Kampala, Uganda, in 1961; Langenhain, near Frankfurt, Germany, in 1964; Panama City, Panama, in 1972; Tiapapata, near Apia, Samoa, in 1984; New Delhi, India, in 1986 (refer to Figure 6-19); and Santiago, Chile, in 2016. The first Bahá'í House of Worship, built in 1908 in Ashgabat, now the capital of Turkmenistan, was turned into a museum by the Soviet Union and demolished in 1963 after a severe earthquake. In addition to the seven Mother Temples, Bahá'í Houses of Worship are located in Cambodia, Colombia, Kenya, and Vanuatu, and several shrines are located in Israel. All Bahá'í Houses of Worship are required to be built in the shape of a nonagon (nine-sided).

Buddhist Pagodas. Pagodas contain relics that Buddhists believe to be a portion of Buddha's body or clothing (Figure 6-44). After Buddha's death, his followers scrambled to obtain these relics. As part of the process of diffusing the religion, Buddhists carried these relics to other countries and built pagodas for them. Pagodas typically include tall, many-sided towers arranged in a series of tiers, balconies, and slanting roofs. Pagodas are not designed for congregational worship. Individual prayer or meditation is more likely to be undertaken at an adjacent temple, at a remote monastery, or in a home.

Hindu Temples. Important Hindu religious functions are more likely to take place at home within the family. A Hindu temple is a structure designed to bring individuals closer to their gods. It serves as a shrine to one or more gods and as a place for individual reflection and meditation, in accordance with one's personal practices within the faith.

As with many other elements of Hinduism, the time and place of origin of temples are unknown. Detailed evidence of the existence of temples dates from the first century B.C.E. Size and number of temples are determined by local preferences and commitment of resources rather than standards imposed by religious doctrine.

Pause & Reflect 6.3.1 What differences appear in the images of a Buddhist pagoda and a Christian church?

▲ **FIGURE 6-43 SIKH GURDWARA** The Harmandir Sahib, known informally as the Golden Temple, Amritsar, India.

▲ **FIGURE 6-44 BUDDHIST PAGODA** Shwedagon Pagoda (Golden Dagon Pagoda), Yangon, Myanmar. The first pagoda on this site was erected 2,500 years ago.

Administration of Religious Space

Learning Outcome 6.3.2 Compare the administrative organization of hierarchical and locally autonomous religions.

Followers of a universalizing religion must be connected in order to ensure communication and consistency of doctrine. The method of interaction varies among universalizing religions, branches, and denominations. Ethnic religions tend not to have organized, central authorities.

Locally Autonomous Religions

Some universalizing religions are highly **autonomous religions**, or self-sufficient, and interaction among communities is confined to little more than loose cooperation and shared ideas. Islam and some Protestant denominations are good examples.

Local Autonomy in Islam. Among the three large universalizing religions, Islam provides the most local autonomy. Like other locally autonomous religions, Islam has neither a religious hierarchy nor a formal territorial organization.

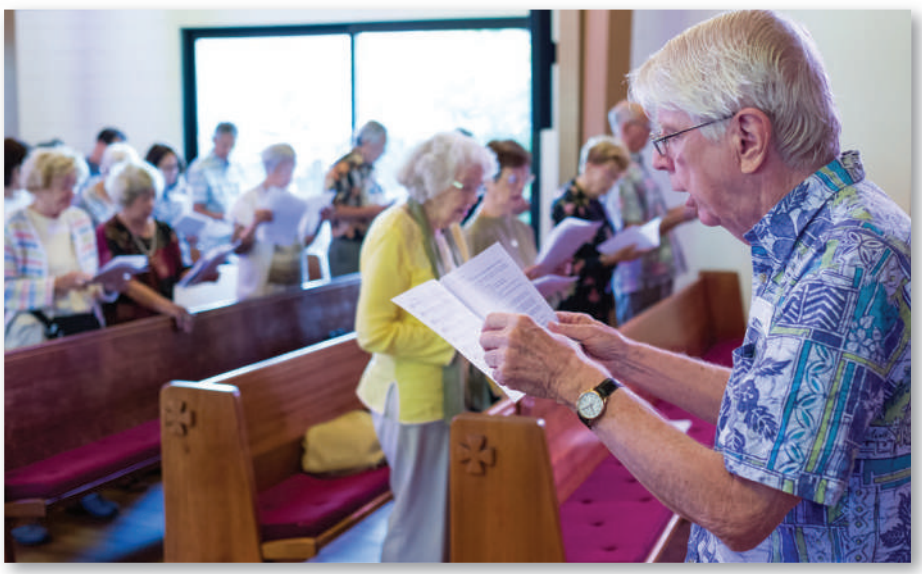
A mosque is a place for public prayer, led by an imam, but everyone is expected to participate equally in the rituals and is encouraged to pray privately (Figure 6-45). In the absence of a hierarchy, the only formal organization of territory in Islam is through the coincidence of religion-oriented territory with nonreligion-oriented states. Governments in some predominantly Islamic countries include in their bureaucracy people who administer Islamic institutions. These administrators interpret Islamic law and run welfare programs. Strong unity in the Islamic world is maintained by a relatively high degree of communication and migration, such as the pilgrimage to Makkah. In addition, uniformity is fostered by Islamic doctrine, which offers more explicit commands than most other religions.

Protestant Denominations. Protestant Christian denominations vary in geographic structure from extremely autonomous to somewhat hierarchical. The Episcopalian, Lutheran, and most Methodist churches have hierarchical structures, somewhat comparable to the Roman Catholic Church but led by bishops, not by a single leader such as the pope. Extremely autonomous denominations such as Baptists and United Church of Christ are organized into self-governing congregations. Each congregation establishes the precise form of worship and selects the leadership (Figure 6-46).

Presbyterian churches represent an intermediate degree of autonomy. Individual churches are united in a presbytery, several of which in turn are governed by a synod, with a general assembly as ultimate authority over all churches. Each Presbyterian church is governed by an elected board of directors with lay members.

Ethnic Religions. Hinduism is highly autonomous because worship is usually done alone or with others in the household. Hindus share ideas primarily through undertaking pilgrimages and reading traditional writings. Hinduism has no centralized structure of religious control.

▲ **FIGURE 6-45 LOCALLY AUTONOMOUS ISLAM** The shrine of Imam Ali, in Najaf, Iraq, contains the tomb of Ali, from whom the Shiite branch of Islam is traced.



▲ **FIGURE 6-46 LOCALLY AUTONOMOUS PROTESTANT CHURCH** Waiokeola Congregational Church, Honolulu.

Hierarchical Religions

A **hierarchical religion** has a well-defined geographic structure and organizes territory into local administrative units. The Church of Jesus Christ of Latter-day Saints and Roman Catholicism are examples of hierarchical religions.

Latter-Day Saints. Latter-day Saints (Mormons) exercise strong organization of the landscape. The territory occupied by Mormons, primarily Utah and portions of surrounding states, is organized into wards. Several wards are combined into a stake of approximately 5,000 people. The highest authority in the Church – the board and president – sometimes redraws ward and stake boundaries in rapidly growing areas to reflect the ideal population standards.

Roman Catholic Hierarchy. The Roman Catholic Church has organized much of Earth's inhabited land into an administrative structure accountable to the pope in Rome. The basic unit of geographic organization in the Roman Catholic Church is the diocese (Figure 6-47). A diocese is administered by a bishop, who has a headquarters, called a "see," which is typically the largest city in the diocese. A diocese is spatially divided into parishes, each headed by a priest who reports to the bishop.

A province consists of several dioceses. A province is headed by an archbishop, who is also the bishop of one diocese within the province. Bishops report to an archbishop. Some distinguished archbishops are elevated to the rank of cardinal. Archbishops report to the pope who is also the bishop of the Diocese of Rome.

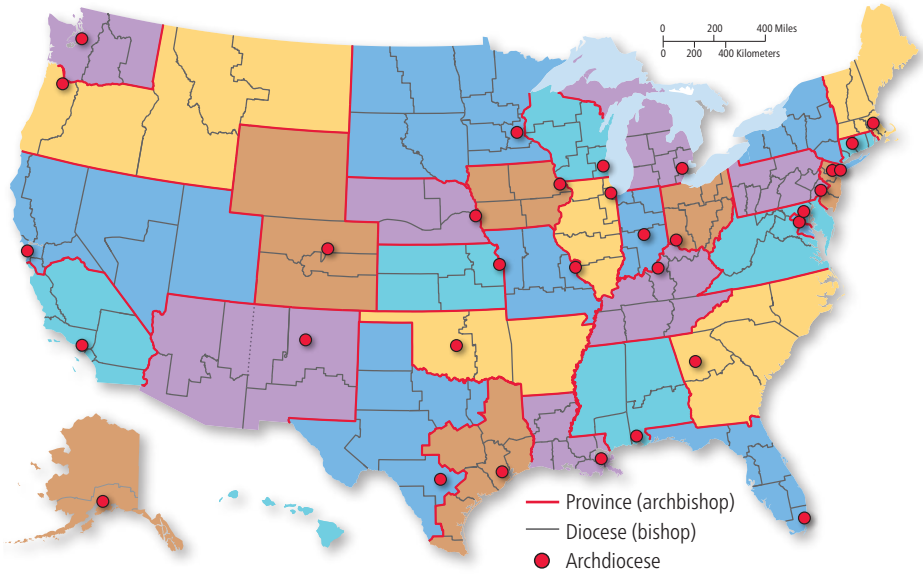
The area and population of parishes and dioceses vary according to historical factors and the distribution of Roman Catholics across Earth's surface. In parts of Europe, the overwhelming majority of the dense population is Roman Catholic (Figure 6-48). Consequently, the density of parishes is high. A typical parish may encompass only a few square kilometers and fewer than 1,000 people. At the other extreme, Latin American parishes may encompass several hundred square kilometers and 5,000 people.

The more dispersed Latin American distribution is attributable partly to a lower population density than in Europe. If Latin America had small parishes, many would be too remote for the priest to communicate with others in the hierarchy. The less intensive network of Roman Catholic institutions also results in part from colonial traditions, as both Portuguese and Spanish rulers discouraged parish development in Latin America.

The Roman Catholic population is growing rapidly in the U.S. Southwest and in suburbs of some large North American and European cities. Some of these areas have a low density of parishes and dioceses compared to the population, so the Church must adjust its territorial organization.

New local administrative units can be created, although funds to provide the desired number of churches, schools, and other religious structures might be scarce. Conversely, the Roman Catholic population is declining in inner cities and rural areas. Maintaining services in these areas is expensive, but the process of combining parishes and closing schools is very difficult.

Pause & Reflect 6.3.2 What are the different spatial units of administration in the Roman Catholic Church?



▲ **FIGURE 6-47 ROMAN CATHOLIC HIERARCHY IN THE UNITED STATES**

▼ **FIGURE 6-48 ROMAN CATHOLIC CHURCH** St. Peter's Basilica, Vatican City State.

Religious Landscapes

Learning Outcome 6.3.3 Give examples of religious settlements and religious toponyms.

Buildings for worship and sites for burial are individual expressions of religious faith on the landscape, but there are also extensive examples such as religious communities. Most human settlements serve an economic purpose, but some are established primarily for religious reasons.

FIGURE 6-49 UTOPIAN SETTLEMENT The Roofless Church, New Harmony, Indiana. The utopian settlement of New Harmony was founded in 1814 by Harmonists, people who migrated to the United States to escape persecution in Germany. The Harmonists left Indiana and returned to their first U.S. settlement in Pennsylvania in 1824. They sold New Harmony to a second group of utopians, who were social reformers rather than associated with a religious group. The nondenominational Roofless Church was dedicated in 1960.

Utopian Settlements

A **utopian settlement** is a community built to reflect the ideals of a particular religious or social group. Buildings are sited and economic activities organized to integrate the group's values into all aspects of daily life. By 1858, some 130 utopian settlements had been established in the United States, including Bethlehem, Pennsylvania; Oneida, New York; Ephrata, Pennsylvania; Nauvoo, Illinois; and New Harmony, Indiana (Figure 6-49).

The culmination of the utopian movement in the United States was the founding of Salt Lake City by the Latter-day Saints (Mormons), beginning in 1848. The layout of Salt Lake City is based on a plan of the city of Zion given to the church elders in 1833 by the Mormon prophet Joseph Smith. The city has a regular grid pattern, broad boulevards, and church-related buildings situated at strategic points (Figure 6-50).

FIGURE 6-50 SALT LAKE CITY The Salt Lake Temple of The Church of Jesus Christ of Latter-day Saints is positioned at the center of the city.

Most utopian communities declined in importance or disappeared altogether. Some disappeared because the inhabitants were celibate; in other cases, residents moved away in search of better economic conditions. The utopian communities that have not been demolished are now inhabited by people who are not members of the original religious sect, although a few have been preserved as museums.

Religious Place Names

Roman Catholic immigrants have frequently given religious place names, or toponyms, to their settlements in the New World, particularly in Québec and the U.S. Southwest. Québec's boundaries with Ontario and the United States clearly illustrate the difference between toponyms selected by Roman Catholic and Protestant settlers. Religious place names are common in Québec but rare in its two neighbors (Figure 6-51).

Pause & Reflect 6.3.3 What examples of religious toponyms can you find in your community?

FIGURE 6-51 RELIGIOUS TOPONYMS Place names near Québec's boundaries with Ontario and the United States show the imprint of religion on the landscape. In Québec, a province with a predominantly Roman Catholic population, a large number of settlements are named for saints.

Disposing of the Dead

A prominent example of religiously inspired arrangement of land at a smaller scale is burial practices. Climate, topography, and religious doctrine combine to create differences in practices to shelter the dead.

Burial. Christians, Muslims, and Jews usually bury their dead in a specially designated area called a cemetery. The Christian burial practice can be traced to the early years of the religion. In ancient Rome, underground passages known as catacombs were used to bury early Christians (and to protect the faithful when the religion was still illegal). After Christianity became legal, Christians buried their dead in the yard around the church. As these burial places became overcrowded, separate burial grounds had to be established outside the city walls.

Public health and sanitation considerations in the nineteenth century led to public management of many cemeteries. Some cemeteries are still operated by religious organizations. The remains of the dead are customarily aligned in some traditional direction. Some Christians bury the dead with the feet toward Jerusalem so that they may meet Jesus there on the Day of Judgment.

Cemeteries may consume significant space in a community, increasing the competition for scarce land. In congested urban areas, Christians and Muslims have traditionally used cemeteries as public open space. Before the widespread development of public parks in the nineteenth century, cemeteries were frequently the only green space in rapidly growing cities. Cemeteries are still used as parks in Islamic countries, where the idea faces less opposition than in Christian societies.

Traditional burial practices in China have put pressure on agricultural land. By burying dead relatives, rural residents have removed as much as 10 percent of the land from productive agriculture. The government in China has ordered the practice discontinued, even urging farmers to plow over old burial mounds. Cremation is encouraged instead.

Other Methods of Disposing of Bodies. Not all faiths bury their dead. The Hindu custom of antyesti involves cremation rather than burial (Figure 6-52). The body is washed, wrapped in cloth, and burned with a slow fire on a funeral pyre. Burial is reserved for children, ascetics, and people with certain diseases. Antyesti is considered an act of purification, although it tends to strain India's wood supply. Motivation for cremation may have originated from unwillingness on the part of nomads to leave their dead behind, possibly because of fear that the body could be attacked by wild beasts or evil spirits or even return to life.

Cremation, as some religions profess, could also free the soul from the body for departure to the afterworld and provide warmth and comfort for the soul as it embarked on the journey to the afterworld. Cremation was the principal form of disposing of bodies in Europe before Christianity. It is still practiced in parts of Southeast Asia, possibly because of Hindu influence.

In Western Asia, neither cremation nor burial is a practice in Zoroastrianism, one of the world's oldest religions that originated in Persia (what is Iran today) around 600 B.C.E. To strip away unclean portions of the body, Zoroastrians (Parsis) expose the dead to scavenging birds and animals because they do not want the body to contaminate the sacred elements of fire, earth, or water. The dead are exposed in a circular structure called a dakhma, or tower of Silence (Figure 6-53). Tibetan Buddhists also practice exposure for some dead, with cremation reserved for the most exalted priests.

Disposal of bodies at sea is used in some parts of Micronesia, but the practice is much less common than in the past. The bodies of lower-class people would be flung into the sea; elites could be set adrift on a raft or boat. Water burial was regarded as a safeguard against the living being contaminated by the dead.

▼ **FIGURE 6-52 HINDU CREMATION** Hindus consider the Manikarnika Ghat (the steps leading to the Ganges at Varanasi, India) to be the most auspicious place for a cremation.

▼ **FIGURE 6-53 ZOROASTRIAN TOWER OF SILENCE, YAZD, IRAN** A structure for dead bodies to be exposed to vultures.

Pilgrimages to Religious Shrines

Learning Outcome 6.3.4 Describe places to which Muslims, Buddhists, and Hindus make pilgrimages.

Buddhism and Islam are the universalizing religions that place the most emphasis on identifying shrines. Places are holy because they are the locations of important events in the life of Buddha or Muhammad. Making a **pilgrimage** to these holy places – a journey for religious purposes to a place considered sacred – is incorporated into the rituals of some religions.

Holy Places in Islam

The holiest locations in Islam are in cities associated with the life of Muhammad. The holiest city for Muslims is Makkah (Mecca), the birthplace of Muhammad. The word *mecca* now has a general meaning in the English language as a goal sought or a center of activity.

Now a metropolitan area of 2.1 million inhabitants, Makkah contains the holiest object in the Islamic landscape, namely al-Ka'bah, a cube-like structure encased in silk. Al-Ka'bah stands at the center of the Great Mosque, Masjid al-Haram, Islam's largest mosque. Al-Ka'bah, thought by Muslims to have been built by Abraham and Ishmael, contains a black stone that Muslims believe was given to Abraham by Gabriel as a sign of a covenant with Ishmael and the Muslim people.

Al-Ka'bah had been a religious shrine in Makkah for centuries before the origin of Islam. After Muhammad defeated the local people, he captured al-Ka'bah, cleared it of idols, and rededicated it to the all-powerful Allah (God). According to Islamic tradition, the Masjid al-Haram mosque also contains the well of Zamzam, considered to have the same source as the water given to Hagar by the angel Gabriel to quench the thirst of her infant, Ishmael.

The second-most-holy geographic location in Islam is Madinah (Medina), a metropolitan area of 1.5 million inhabitants, 340 kilometers (210 miles) north of Makkah. Muhammad received his first support from the people of Madinah and became the city's chief administrator. Muhammad's tomb is at Madinah, inside Al-Masjid an-Nabawī, Islam's second-largest mosque (refer to Figure 6-22).

Muslims are especially encouraged to make pilgrimages to visit holy places in accordance with recommended itineraries. Every healthy Muslim who has adequate financial resources is expected to undertake a pilgrimage, called a hajj, to Makkah (Mecca). Regardless of nationality and economic background, most pilgrims dress alike, in plain white robes, to emphasize common loyalty to Islam and the equality of people in the eyes of Allah. A precise set of rituals is practiced, culminating in a visit to al-Ka'bah.

In 2019, the last year before the COVID-19 pandemic disrupted travel, the hajj attracted 2.5 million Muslims, including one-fourth from Saudi Arabia and three-fourths from other countries (Figure 6-54). Although Indonesia is the country with the most Muslims, only 2 percent of pilgrims to Makkah came from there because of the relatively long travel distance.

Pause & Reflect 6.3.4 Based on the lives of Buddha and Muhammad, what types of sites are likely to be goals of pilgrimage for the followers of a universalizing religion?

▼ **FIGURE 6-54 MASJID AL-HARAM, MAKKAH, SAUDI ARABIA** Surrounding al-Ka'bah are Muslims who undertook a hajj in 2016, before the COVID-19 pandemic disrupted travel.

Buddhist Shrines

Four places in a small area of northeastern India and southern Nepal are holy to Buddhists because of their association with events in Buddha's life (Figure 6-55):

- Lumbinī, in southern Nepal, is where Buddha was born around 563 B.C.E. Many sanctuaries and monuments were built there, but all are in ruins today.
- Bodh Gaya, around 500 kilometers (300 miles) southeast of Buddha's birthplace, is the site of the second great event in his life, where he attained enlightenment. A temple has stood near the site since the third century B.C.E., and part of the surrounding railing built in the first century C.E. still stands (refer to Figure 6-23). Because Buddha reached perfect enlightenment while sitting under a bodhi (or bo) tree, that tree has become a holy object as well. To honor Buddha, bodhi trees have been diffused to other Buddhist countries, such as China and Japan.
- Deer Park in Sarnath, where Buddha gave his first sermon, is the third important location. The Dhamek Stupa was first constructed at Sarnath in 249 B.C.E. and replaced with the current structure around 500 C.E. Nearby is now a major library of Buddhist literature, including many works removed from Tibet when Tibet's Buddhist leader, the Dalai Lama, went into exile in 1959.
- Kushinagar, the fourth holy place, is where Buddha died at age 80 and passed into Nirvana, a state of peaceful extinction. Temples built at the site are currently in ruins.

Four other sites in northeastern India are particularly sacred because they were the locations of Buddha's principal miracles:

- Śrāvastī is where Buddha created multiple images of himself and visited heaven.
- Sankashya is where Buddha ascended to heaven, preached to his mother, and returned to Earth.
- Rājagṛha is where Buddha tamed a wild elephant. After Buddha's death, it was the site of the first Buddhist Council.
- Vaiśālī is where Buddha announced his impending death. It was the site of the second Buddhist Council.

Hinduism's South Asian Landscape

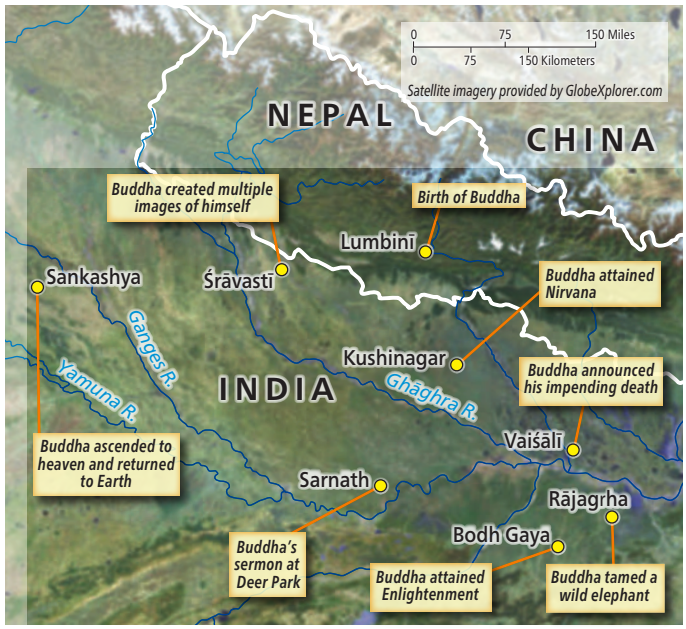
As an ethnic religion of India, Hinduism is closely tied to the physical geography of India. According to a survey conducted by the geographer Surinder Bhardwaj, the natural features most likely to rank among the holiest shrines in India are riverbanks and coastlines. Hindus consider a pilgrimage, known as a tirtha, to be an act of purification. Although not a substitute for meditation, the pilgrimage is an important act in achieving redemption. Hindu holy places are organized into a hierarchy.

Particularly sacred places attract Hindus from all over India despite the relatively remote locations of some; less important shrines attract primarily local pilgrims. Because Hinduism has no central authority, the relative importance of shrines is established by tradition, not by doctrine. For example, many Hindus make long-distance pilgrimages to Mt. Kailash, located at the source of the Ganges in the Himalayas, which is holy because Shiva, one of the main deities, lives there (Figure 6-56). Other mountains may attract local pilgrims if Shiva is thought to have visited at one time.

Hindus believe that they achieve purification by bathing in holy rivers. The Ganges is the holiest river in India because it is supposed to spring from the hair of Shiva. Indians come from all over the country to Haridwar, the most popular location for bathing in the Ganges (refer to Figure 6-24).

The remoteness of holy places from population clusters once meant that making a pilgrimage required major commitments of time and money as well as undergoing considerable physical hardship. Modern transportation increases the accessibility of shrines. Hindus can now reach holy places in the Himalaya Mountains by bus or car, and Muslims from all over the world can reach Makkah by airplane.

▼ **FIGURE 6-55 HOLY PLACES IN BUDDHISM** Buddha and his disciples would have walked from place to place amid the river valleys and plains of northern India, then a region of farming villages divided among several kingdoms.



▼ **FIGURE 6-56 MOUNT KAILASH, INDIA** Holy to Hindu, Buddhists, and Jains.

The Environment & Religious Calendars

Learning Outcome 6.3.5 Understand the roles of holidays and calendars in various religions.

Cosmogony is a set of religious beliefs concerning the origin of the universe. The universalizing religions Christianity and Islam consider that God (or Allah, for Islam) created the universe, including Earth's physical environment and human beings. Religious people in these traditions believe that they can best serve the Creator by cultivating the land, draining wetlands, clearing forests, building new settlements, and otherwise making productive use of natural features that the Creator made.

The cosmogony underlying Chinese traditional religions is that the universe is made up of two forces, yin and yang, which exist in everything. The force of yin (earth, darkness, female, cold, depth, passivity, and death) interacts with the force of yang (heaven, light, male, heat, height, activity, and life) to achieve balance and harmony. An imbalance results in disorder and chaos. To primal-indigenous folk religionists, the powers of the universe are mystical, and only a few people on Earth can harness these powers for medical or other purposes. Spirits or gods can be placated, however, through prayer and sacrifice. Rather than attempt to transform the environment, they accept environmental hazards as normal and unavoidable.

Types of Calendars

Religions adopt different types of annual calendars: solar, lunar, and lunisolar. A **solar calendar** has months that correspond to the season or the apparent position of the sun in relation to the stars. A **lunar calendar** has months that correspond to cycles of moon phases. A **lunisolar calendar** has lunar months that are brought into alignment with the solar year through periodic adjustment.

The solar calendar, such as followed by Christians, has 12 months, each containing 30 or 31 days, taking up the astronomical slack with 28 or 29 days in February. Islam uses a lunar calendar, which has around 354 days. The Jewish calendar is lunisolar, with most years comprising around 354 days, but adding a thirteenth month every two or three years to line up with agricultural and solar calendars.

Regardless of the type that is used, the annual calendar of a religion typically includes holidays with theological themes. In universalizing religions, major holidays often relate to events in the life of the founder. A prominent feature of ethnic religions is the idea that adherents have a shared history, language, and destiny, and the calendar and holidays often refer to this shared history. An ethnic religion may also refer to distinctive physical geography such as celebration of the seasons – the calendar's annual cycle of variation in climatic conditions. Rituals may be performed to pray for favorable environmental conditions or to give thanks for past successful harvests.

The Solstice

The **solstice** has special significance in some ethnic religions. A major holiday in some religions is the winter solstice, December 21 or 22 in the Northern Hemisphere. The winter solstice is the shortest day and longest night of the year, when the Sun appears lowest in the sky, and the apparent movement of the Sun's path north or south comes to a stop before reversing direction. (*Solstice* comes from the Latin to "stand still."). Stonehenge, a collection of stones erected in southwestern England some 4,500 years ago (Figure 6-57), is a prominent remnant of a structure apparently aligned so that the Sun rises directly between two stones on the summer and winter solstices.

▼ **FIGURE 6-57 STONEHENGE** The 30 enormous stones that comprise Stonehenge were erected around 4,500 years ago. The stones replaced earlier circular arrangements made originally of timber, probably around 5,000 years ago.

The Calendar in Several Religions

The principal purpose of the holidays in universalizing religions is to commemorate events in the founder's life. Examples of religious holidays can be found in the various universalizing religions.

Islam. Islam uses a lunar calendar. In a 30-year cycle, the Islamic calendar has 19 years with 354 days and 11 years with 355 days. As a result, Islamic holidays arrive in different seasons from generation to generation.

The start of Ramadan, during which Muslims fast from sunup to sundown, has in recent years occurred in the Northern Hemisphere spring – for example, March 22, 2023, on the western Gregorian calendar. In 2010, Ramadan started in the Northern Hemisphere summer on August 10, and in 2030 Ramadan will start in the winter on January 5. Because Ramadan occurs at different times of the solar year in different generations, the number of hours of the daily fast varies widely because the amount of daylight varies by season and by location on Earth's surface.

Observance of Ramadan can be a hardship because it can interfere with critical agricultural activities, depending on the season. However, as a universalizing religion with 1.9 billion adherents worldwide, Islam is practiced in various climates and latitudes.

Christianity. Christians commemorate the birth of Jesus on Christmas Day, but not all Christians observe Christmas on the same day. Orthodox churches use the Julian calendar, a solar calendar introduced by Julius Caesar in 46 B.C.E. with the help of Greek astronomers to replace a lunar calendar then in use in ancient Rome. Other Christians follow the Gregorian calendar, which was introduced by Pope Gregory XIII in 1582. The Gregorian calendar is also a solar calendar, but differs slightly from the Julian calendar in their handling of leap years. Christmas is December 25 on the Gregorian calendar and January 7 on the Julian calendar.

Christians associate their holidays with seasonal variations in the calendar, but climate and the agricultural cycle are not central to the liturgy and rituals. Most Northern Europeans and North Americans associate Christmas Day with wintry conditions, whereas for Christians in the Southern Hemisphere, Christmas Day is the height of summer, with warm days and abundant sunlight.

Buddhism. All Buddhists celebrate as major holidays Buddha's birth, Enlightenment, and death. However, not all Buddhists observe them on the same days. Theravadist Buddhists observe all three events on the same day, usually in May. However, some Buddhists observe them on different days.

Sikhism. The major holidays in Sikhism are the births and deaths of the religion's 10 gurus. The tenth guru, Gobind Singh, declared that after his death, instead of an eleventh guru, Sikhism's highest spiritual authority would be the holy scriptures the Guru Granth Sahib. The most important holidays in Sikhism are festivals marking the birthday or martyrdom of a guru. Commemorating historical events distinguishes Sikhism as a universalizing religion, in contrast to India's major ethnic religion, Hinduism, which glorifies the physical geography of India.

▲ **FIGURE 6-58 HOLIDAYS IN JUDAISM** Jews bless the *etrog* (citron) and *lulav* (date palm branches) during the holiday of Sukkot at a synagogue in Brooklyn, New York.

Bahá'í. The Bahá'ís use a calendar established by the Báb and confirmed by Bahá'u'lláh, in which the year is divided into 19 months of 19 days each, with the addition of four extra days (five in leap years). The year begins on the first day of spring, March 20 or 21, one of several holy days in the Bahá'í calendar. Bahá'ís attend the Nineteen Day Feast, held on the first day of each month of the Bahá'í calendar, to pray, read scriptures, and discuss community activities.

Judaism. In contrast with other religions that originated in Southwest Asia, major holidays in Judaism are connected to the agricultural calendar of the religion's homeland in present-day Israel. These holidays are known as pilgrimage festivals because the Torah called for the Israelites to come to the Temple in Jerusalem. Major Jewish holidays include:

- Pesach (Passover) celebrates the liberation of the Jews from slavery in Egypt to freedom and the time for harvesting barley in the land of Israel.
- Shavuot (Feast of Weeks), which falls exactly seven weeks after Pesach, comes at the time for harvesting wheat. It is also considered the date when Moses received the Torah from God.
- Sukkot recalls the period of 40 years when the Israelites were in the desert and relied on God for food and shelter. The term *sukkot* derives from the Hebrew word for the "booths," or "temporary shelters," which the Israelites used in the desert. Sukkot also celebrates the final harvest of the year. Prayers, especially for rain, are offered to bring success to the upcoming agricultural year (Figure 6-58).

Pause & Reflect 6.3.5 Why do some religions organize their annual calendars according to the lunar or lunisolar cycle?

KEY ISSUE

6.4 | Why Do Territorial Conflicts Arise Among Religious Groups?

Religion is an element of cultural diversity that has led to disputes in some places. The attempt by intense adherents of one religion to organize Earth's surface can conflict with the spatial expression of other faiths or of nonreligious ideas. Conflicts arise in all continents, but disputes involving religious groups have been especially intense across Asia.

Religions & Social Change

Learning Outcome 6.4.1 State reasons for geographic conflicts between religious and secular cultural groups.

Contributing to more intense religious conflict has been a resurgence of religious fundamentalism. As the name implies, **fundamentalism** is a literal interpretation and a strict and intense adherence to what the fundamentalists define as the basic principles of a religion (or a religious branch, denomination, or sect).

The use of *fundamentalism* started in the nineteenth century as a term for some fundamental principles held by some Protestants in the United States. More recently, *fundamentalism* has instead been used to refer to groups who mix politics with aspects of their religion and make claims that their views are the only correct views. These groups sometimes advocate and practice violence to enforce their claims.

▲ **FIGURE 6-59 HINDU CASTE SYSTEM** Women demonstrate for Dalit rights, Bangalore, India.

India: Hinduism & Social Equality

Changing cultural, political, and economic customs can sometimes conflict with traditional religious values. In South Asia, Hinduism has been forced to react to **secular** ideas, which are attitudes or activities that have no religious or spiritual basis.

Hinduism has been strongly challenged since the 1800s, when British colonial administrators introduced their social and moral concepts to India. The most vulnerable aspect of the Hindu religion was its rigid **caste** system, which indicated the class or distinct hereditary order into which a Hindu was born, according to religious law.

The caste system apparently originated around 1500 B.C.E., when Aryans invaded India from the west. The Aryans divided themselves into four castes, known as **varna**, that developed strong differences in social and economic position: Brahmans (priests and top administrators), Kshatriyas (warriors), Vaisyas (merchants), and Shudras (agricultural workers and artisans). These four castes are now known as General Category castes. Around 30 percent of Indians currently identify as belonging to one of the four General Category castes.

Below the four General Category castes is the Scheduled Caste, often known as Dalit, which is Sanskrit and Hindi for "broken" or "scattered." The Dalits did work considered too dirty for other castes. In theory, the Dalits were descended from the Indigenous people who lived in India prior to the Aryan conquest. Around 25 percent of Indians identify as belonging to the Scheduled Caste. The remaining Indians identify as belonging to a social class below even that of the Dalits.

The type of Hinduism practiced depends in part on an individual's varna. A high-caste Brahman may practice a form of Hinduism based on knowledge of relatively obscure historical texts. At the other end of the caste system, a low-caste, illiterate person in a rural village may perform religious rituals without knowledge of or access to a highly developed set of written explanations.

Over the centuries, the original castes split into thousands of subcastes. Until recently, social relations among the castes were limited, and the rights of non-Brahmans, especially Dalits, were restricted (Figure 6-59). At the time of colonization, British administrators and Christian missionaries pointed out the shortcomings of the caste system, such as neglect of the Dalits' health and economic problems.

The rigid varna system has been considerably relaxed in recent years. But consciousness of caste persists: According to the Pew Research Center, most Indians report that their close friends are mostly members of their own caste and that marriage should be between two members of the same caste. India's government has devised a quota system designed to give students from Dalit and other lower social classes more places in the country's universities.

Communism: Religion & Revolution

Organized religion was challenged in the twentieth century by the rise of communist regimes in Europe and Asia that discouraged religious belief and practice. Following the 1917 Bolshevik Revolution, the communist government of the Soviet Union pursued especially strong antireligious programs. Karl Marx had called religion "the opium of the people," a view shared by V. I. Lenin and other early communist leaders. Marxism became the official doctrine of the Soviet Union, so religious doctrine was a potential threat to the success of the revolution. People's religious beliefs could not be destroyed overnight, but the role of religion in Soviet life was sharply reduced.

In 1721, Czar Peter the Great had made the Russian Orthodox Church a part of the Russian government. The Soviet government in 1918 eliminated the official church–state connection. All church buildings and property were nationalized and could be used only with government permission. The Orthodox religion retained adherents, especially among the elderly, but younger people generally had little contact with the church beyond attending a service perhaps once a year. With religious organizations prevented from conducting social and cultural work, religion in the Soviet Union dwindled in daily life.

The late twentieth century, at the end of communist rule in the Soviet Union, brought a religious revival in Eastern Europe, especially where Roman Catholicism is the most prevalent branch of Christianity, which includes Croatia, Czechia, Hungary, Lithuania, Poland, Slovakia, and Slovenia. Property confiscated by the communist governments reverted to church ownership, and church attendance increased.

In recent years, the Russian Orthodox church has retained close ties to Russia's government. This extended to support on the part of Russian Orthodox leaders for Russia's attack on Ukraine in 2022. Russia's President Vladimir Putin justified ordering the invasion of Ukraine in part through false claims that Ukrainians were threatening to destroy Orthodox Christianity.

In countries in Central Asia that were once part of the Soviet Union – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan – most people are Muslims. These newly independent countries are struggling to determine the extent to which laws should be rewritten to conform to Islamic custom rather than to the secular tradition inherited from the Soviet Union.

China: Buddhism & the Dalai Lama

Conflict between the doctrine of communism and the authority of Buddhist religious leaders is especially acute in China. The territory known as Tibet in most of the world but called Xizang by the government of China, is the traditional home of the spiritual leader of Tibetan Buddhists, the Dalai Lama. Before the most recent communist takeover in 1950, daily life in Tibet was traditionally dominated by Buddhist rites.

China, which had ruled Tibet from 1720 until its independence in 1912, invaded the isolated western country, renamed it Xizang Province in 1951, and later installed a communist government. The Chinese sought to reduce the domination of Buddhist traditions by attacking the economic and cultural pillars of daily life. Monasteries and temples were destroyed, and people were required to work on agricultural communes rather than pursue their nomadic way of life as livestock herdsmen.

Tibetan Buddhists believe that when the Dalai Lama dies, his spirit enters the body of a child so that the leader is reincarnated. In this tradition, in 1937, a group of priests located a 2-year-old boy named Tenzin Gyatso and recognized him as the fourteenth Dalai Lama. The child was brought to Lhasa in Tibet when he was 4, enthroned a year later, and trained by priests to assume leadership (Figure 6-60).

An unsuccessful rebellion against Chinese rule in 1959 resulted in the execution or imprisonment of tens of thousands of Tibetans, and forced another 100,000 Tibetans, including the Dalai Lama, to emigrate. Buddhist temples were closed and demolished, and religious artifacts and scriptures were destroyed. Since then, the Dalai Lama and other Tibetan Buddhist leaders have been based in Dharamshala, India.

When the fourteenth Dalai Lama passes away, Buddhist leaders assert that they will find the next Dalai Lama, wherever he is living in the world. However, Chinese government leaders counter that they will be responsible for finding the next Dalai Lama somewhere in Xizang, and they accuse Buddhist leaders of plotting to restore Tibet as an independent country.

Pause & Reflect 6.4.1 Why would the Chinese communists feel it important to dismantle the religious institutions of a poor remote territory?

▲ **FIGURE 6-60 THE FOURTEENTH DALAI LAMA OF TIBET**

Challenges for Religions in Southwest Asia

Learning Outcome 6.4.2 Understand geographic elements of conflicts among religious groups in Southwest Asia.

Intense religious disputes in Southwest Asia have become entwined with ethnic and political conflicts, as discussed in Chapters 7 and 8. Conflict in the portion of Southwest Asia – often referred to as the Middle East or the Eastern Mediterranean – is among the world's longest standing and most intractable. Jews, Christians, and Muslims have fought for many centuries to control the same small strip of land.

Jews, Christians, & Muslims in the Eastern Mediterranean

To some extent, tensions among Christians, Muslims, and Jews in the Middle East stem from their shared heritage. All three groups trace their origins to Abraham in the Hebrew Bible, and all three religions have strong connections to Jerusalem.

Judaism considers the land of Israel to be holy and Jerusalem its holiest city. The major events in the development of Judaism took place there, and the religion's customs and rituals acquired meaning from the agricultural life of the ancient Israelite tribes. Descendants of 10 of Jacob's sons, plus two of his grandsons, constituted the 12 tribes of Israelites who escaped slavery in Egypt, according to the Book of Exodus. Around 3,000 years ago, the Kingdom of Israel, was established with Jerusalem as its capital (Figure 6-61).

After the Romans gained control of this land, which they later renamed the province of Palestine, they expelled most of the Jews, and only a minority of Jews were able to live in the region until the twentieth century. While small numbers of Jews returned to the land over the centuries, Jews around the world maintained a strong connection to the land through the Hebrew Bible and daily prayers oriented to Jerusalem.

Christianity considers this area to be the Holy Land and Jerusalem the Holy City because the major events in Jesus's life, death, and resurrection were concentrated there. Most inhabitants of Palestine accepted Christianity after the religion was officially adopted by the Roman Empire.

In the seventh century C.E., Muslims from the Arabian Peninsula came and captured most of the Middle East, including Palestine and Jerusalem. The Arab Islamic presence diffused the Arabic language across the Middle East and subsequently converted most of the people in that region from Christianity to Islam. Muslims regard Jerusalem as their third-holiest city, after Makkah and Madinah, because it is the place from which Muhammad is thought by Muslims to have ascended to heaven.

To recapture the Holy Land from its Islamic conquerors, European Christians launched a series of military campaigns, known as Crusades, over a 200-year period. Crusaders captured Jerusalem from the Muslims in 1099 during the First Crusade, lost it in 1187, failed to recapture it during the Third, Fourth, and Fifth Crusades, regained it in 1229 as part of a treaty ending the Sixth Crusade, and lost it again in 1244. The Crusades ended when the Muslims defeated the Christians in 1291 at Acre, the last Christian stronghold.

The Islamic Ottoman Empire controlled the Palestine region for most of the four centuries between 1516 and 1917. Inspired by other nationalist movements and the rise of anti-Semitism in the late nineteenth century, Jews began returning in larger numbers to their historic homeland. Upon the Ottoman Empire's defeat in World War I, the United Kingdom took control of Palestine, under a mandate from the League of Nations.

In the first years of administering the Mandate, the British government supported what it called a "national home for the Jewish people," and some Jews were allowed to immigrate to Palestine. But immigration was restricted again during the 1930s, in response to intense pressure by Arabs in the region. As violence initiated by both Jewish and Islamic settlers escalated after World War II, the British announced their intention to withdraw from Palestine, setting the scene for the region's contemporary disputes.

Pause & Reflect 6.4.2 How does the market street in Jerusalem differ from where you get your household supplies?

▲ **FIGURE 6-61 STREET MARKET, OLD CITY OF JERUSALEM, ISRAEL**

Arab-Israeli Wars

The conflict in the Middle East is now played out primarily among various countries and groups of people aspiring to control territory. But differences in religious traditions and their uses in nationalist ideologies underlie the origins of the conflicts and the challenges in peacefully resolving them.

The United Nations voted in 1947 to partition the U.K. Palestine Mandate into two independent states, one Jewish and one Arab. Jerusalem was to be an international city, open to all religions, and run by the U.N. (Figure 6-62a). When the British withdrew in 1948, Jews declared an independent State of Israel within the boundaries prescribed by the U.N. resolution. Over the next quarter-century, neighboring Arab states fought four wars with Israel.

1948–1949 War. The day after Israel declared independence in 1948, five Arab states (Egypt, Iraq, Jordan, Lebanon, and Syria) began a war. Israel survived the attack, and the combatants signed an armistice in 1949. Israel's boundaries were extended beyond the U.N. partition, including the western suburbs of Jerusalem. Jordan gained control of the West Bank and East Jerusalem, including the Old City, where holy places are clustered. Egypt took control of the Gaza Strip (Figure 6-62b).

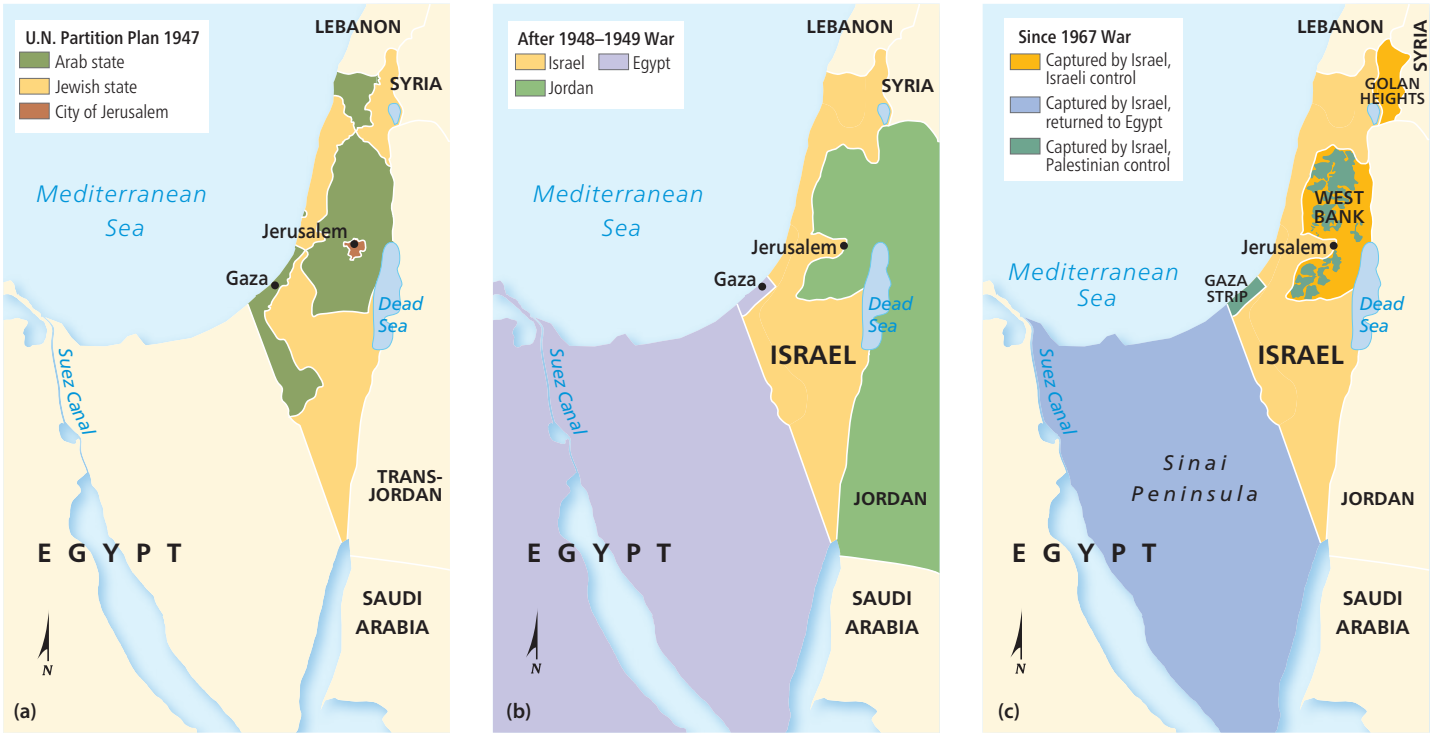
1956 Suez War. Egypt nationalized the Suez Canal, a key shipping route between Europe and Asia, that had been built and controlled up until then by France and the United Kingdom. Egypt also blockaded international waterways near its shores that Israeli ships were using. Israel, France, and the United Kingdom attacked Egypt and got the waterways reopened, although Egypt retained control of the Suez Canal.

1967 Six-Day War. Israel's neighbors amassed a quarter-million troops along the borders and again blocked Israeli ships from using international waterways. In retaliation, Israel launched a surprise attack, destroying the coalition's air forces. Israel captured territory (Figure 6-62c):

- From Jordan, the Old City of Jerusalem and the West Bank (the territory west of the Jordan River taken by Jordan in the 1948–1949 War).
- From Syria, the Golan Heights.
- From Egypt, the Gaza Strip (taken by Egypt in the 1948–1949 War) and the Sinai Peninsula.

1973 Yom Kippur War. A surprise attack on Israel by its neighbors took place on the holiest day of the year for Jews, Yom Kippur. The war ended without a change in territorial control.

Peace Treaty. Egypt's President Anwar Sadat and Israel's Prime Minister Menachem Begin signed a peace treaty in 1979, following a series of meetings with U.S. President Jimmy Carter at Camp David, Maryland. Israel returned the Sinai Peninsula to Egypt, and in return Egypt recognized Israel's right to exist. Sadat was assassinated by Egyptian soldiers, who were extremist Muslims opposed to compromising with Israel, but his successor Hosni Mubarak carried out the terms of the treaty. In 2005, Israel withdrew completely from Gaza, leaving it under Palestinian control. Over a half-century after the Yom Kippur War, the status of other territories controlled by Israel has not been settled.



▲ **FIGURE 6-62 TERRITORIAL CHANGES IN ISRAEL AND ITS NEIGHBORS** (a) The 1947 U.N. Partition Plan, (b) after the 1948-49 War, and (c) after the 1967 Six-Day War. The current status of the West Bank is shown in more detail in Figure 6-65.

Geographic Perspectives in Southwest Asia

Learning Outcome 6.4.3 Explain Israeli and Palestinian perspectives on Israel.

After the 1973 war, the Palestinians emerged as Israel's principal opponent. Egypt and Jordan eventually renounced their claims to the Gaza Strip and the West Bank, respectively, and recognized the Palestinians as the legitimate rulers of these territories. The Palestinians in turn saw themselves as the legitimate rulers of Palestine, which they defined as territory including the State of Israel. Palestinian and Israeli perspectives over the future have not been reconciled.

Israeli Perspectives

In dealing with its neighbors, Israel considers two elements of the local landscape especially meaningful. First, Israel is a small country (smaller than New Hampshire), with a Jewish majority, surrounded by a region of hostile neighbors. In contrast, Islamic Arab countries in the region encompass more than 25 million square kilometers (10 million square miles). Nearly all Israelis live within 20 kilometers (12 miles) of an international border, making them vulnerable to attack. Second, the land between the Mediterranean Sea and the Jordan River is divided into three narrow, roughly parallel physical regions (Figure 6-63):

- A coastal plain along the Mediterranean Sea.
- A series of hills reaching elevations above 1,000 meters (3,300 feet).
- The Jordan River valley, much of which is below sea level (Figure 6-64).

The U.N. plan for the partition of the Palestine Mandate in 1947 allocated most of the coastal plain to Israel, whereas Jordan took most of the hills between the coastal plain and the Jordan River valley, a region generally called the West Bank (of the Jordan River). Farther north, Israel's territory extended eastward to the Jordan River valley, but Syria controlled the highlands east of the valley.

Jordan and Syria used the hills between 1948 and 1967 as staging areas to attack Israeli settlements on the coastal plain and in the Jordan River valley. Israel captured these highlands during the 1967 war to stop attacks on the lowland population and still has military control over the Golan Heights and West Bank. However, attacks by Palestinians against Israeli citizens have continued.

After capturing the West Bank from Jordan in 1967, Israel permitted Jews to construct settlements in the territory. Some Israelis built settlements in the West Bank because they regarded the territory as an integral part of the biblical Jewish homeland, known as Judea and Samaria. Others migrated to the settlements because of a shortage of affordable housing inside Israel's pre-1967 borders. Palestinians see their immigration as a hostile act. Israel has military control over the portion of the West Bank where most of the Jews live.

Israeli Jews have been divided between those who wished to retain some of the West Bank and those who wished to make compromises with the Palestinians in return for formal recognition and a stable peace. A large majority of Israelis supported construction of a barrier around the West Bank.

▲ **FIGURE 6-63 PHYSICAL GEOGRAPHY OF THE EASTERN MEDITERRANEAN** The physical geography consists of narrow coastal lowlands and interior highlands interrupted by the Jordan River valley.

▲ **FIGURE 6-64 JORDAN RIVER VALLEY** Masada Cliff rises above the Dead Sea, the lowest land elevation on Earth at 431 meters (1,412 feet) below sea level.

Pause & Reflect 6.4.3 How does the physical geography of Israel affect Israeli perspectives on the country's security issues?

Palestinian Perspectives

Five groups of people consider themselves Palestinians:

- People living in the West Bank, Gaza, and East Jerusalem territories captured by Israel in 1967.
- Some citizens of Israel who are Arabs.
- People who fled from Israel to other countries after the 1948–1949 War.
- People who fled from the West Bank or Gaza to other countries after the 1967 Six-Day War.
- Some citizens of other countries, especially Jordan, Lebanon, Syria, Kuwait, and Saudi Arabia.

The Palestinian fight against Israel was coordinated by the Palestine Liberation Organization (PLO), under the long-time leadership of Yassir Arafat, until his death in 2004. Israel has permitted the organization of a limited form of government in much of the West Bank and Gaza, called the Palestinian Authority, but Palestinians are not satisfied with either the territory or the power they have received thus far.

The Palestinians are divided by sharp differences, reflected in a struggle for power between the Fatah and Hamas parties. Some Palestinians, especially those aligned with the Fatah Party, are willing to recognize the State of Israel with its Jewish majority in exchange for return of all territory taken by Israel in the 1967 Six-Day War. Other Palestinians, especially those aligned with the Hamas Party, which controls Gaza, do not recognize the right of Israel to exist and want to continue fighting for control of the entire territory between the Jordan River and the Mediterranean Sea. The United States, European countries, and Israel consider Hamas to be a terrorist organization.

The separation barrier is especially controversial because it places on Israel's side around 9 percent of the West Bank, home to around 432,000 Israelis, according to the CIA World Factbook. Palestinians living in the West Bank consider Israel's construction of settlements and the wall to be hostile acts. The wall has helped Jewish settlers increase the territory under their control, but it prevents some Palestinians from reaching their fields and workplaces (Figure 6-66). What the structure is called reflects the conflict. Israel calls the barrier a "security fence," and Palestinians call it a "racial segregation wall." Neutral sources call it a "separation barrier."

▲ **FIGURE 6-65 CURRENT STATUS OF THE WEST BANK**

Separation Barrier

Israel's government has approved construction of a 712-kilometer (442-mile) security barrier separating Israel and the West Bank (Figure 6-65). Approximately two-thirds of the planned route have been built. Israel built the barrier because, during the three years prior to the barrier's construction, hundreds of Israeli citizens (both Jews and Arabs) were victims of 73 Palestinian terrorist attacks originating from the West Bank. Once Israel built the security fence, the number of attacks on Israelis by West Bank Palestinians declined dramatically. Israel has made numerous adjustments to the location of the fence in response to humanitarian concerns and notes that a fence can be removed as part of a peace agreement.

▲ **FIGURE 6-66 SEPARATION BARRIER** Predominantly Jewish community is in the foreground, and predominantly Palestinian community is in the background.

Jerusalem's Challenging Geography

Learning Outcome 6.4.4 Explain the importance of Jerusalem to Jews and Muslims.

At the heart of the conflicts among religious groups in Southwest Asia lies the city of Jerusalem, an important place for several religions (Figure 6-67). Geography makes it difficult to settle long-standing disputes over access to Jerusalem by Jews and Muslims. The challenge is that the most sacred space in Jerusalem for Muslims was literally built on top of the most sacred space for Jews (Figure 6-68).

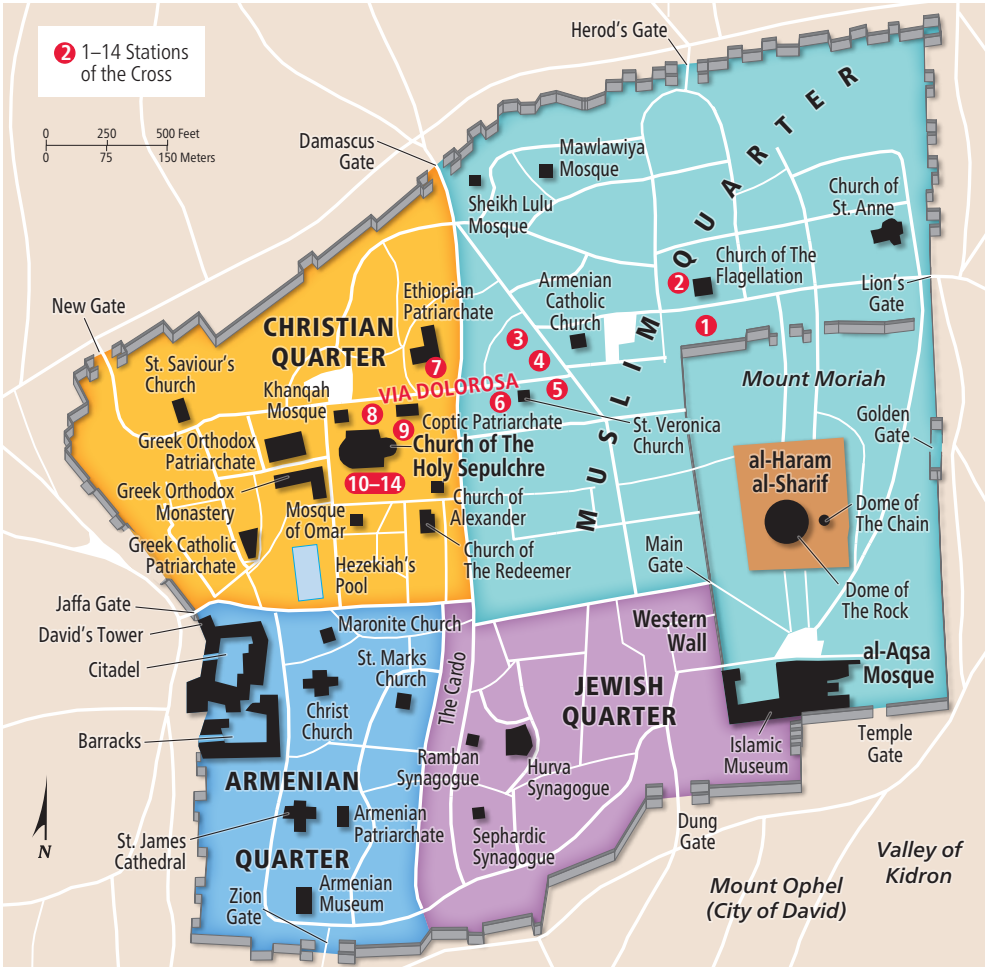


FIGURE 6-67 OLD CITY OF JERUSALEM The Old City of Jerusalem is less than 1 square kilometer (0.4 square miles). It is divided into four quarters. The Stations of the Cross mark the route that Christians believe was taken by Jesus on his way to his crucifixion.

FIGURE 6-68 WESTERN WALL AND DOME OF THE ROCK Jews pray at the Western Wall (foreground), situated immediately below the Mount containing Islam's Dome of the Rock (top left) and al-Aqsa Mosque (top right). The ramp to the right of the Western Wall provides Muslims access to the Mount without requiring them to walk in front of the Jews praying at the base of the Western Wall.

Judaism's Jerusalem

Jerusalem is Judaism's holiest city, established as the capital of the Kingdom of Israel approximately 3,000 years ago, and home to the Temple, their center of life and worship for hundreds of years. The First Temple, built by King Solomon in approximately 957 B.C.E., was destroyed by the Babylonians in 586 B.C.E. After the Persian Empire, led by Cyrus the Great, gained control of Jerusalem, Jews were allowed to build a Second Temple, which was completed in 515 B.C.E. The Romans destroyed the Jewish Second Temple in 70 C.E. The Western Wall of the Temple and an elevated plaza above the wall known as the Temple Mount survive (Figure 6-69).

Christians and Muslims call the Western Wall the Wailing Wall because for many centuries Jews were allowed to visit the surviving Western Wall only once a year to lament the Temple's destruction. After Israel captured the entire city of Jerusalem during the 1967 Six-Day War, officials removed the barriers that had prevented Jews from visiting and living in the Old City of Jerusalem, including the Western Wall. The Western Wall soon became a site for daily prayers by observant Jews.

▲ **FIGURE 6-69 JUDAISM'S JERUSALEM** Ukraine's Ambassador to Israel and other Ukrainians wrapped in Ukraine's flag pray at the Western Wall during Russia's invasion of Ukraine in 2022.

Islam's Jerusalem

The most important Muslim structure in Jerusalem is the Dome of the Rock, which was completed in 691 C.E. Muslims believe that the large rock beneath the building's dome is the place from which Muhammad ascended to heaven, as well as the altar on which Abraham prepared to sacrifice his son Isaac (according to Jews and Christians) or his son Ishmael (according to Muslims). Immediately south of the Dome of the Rock is the al-Aqsa Mosque. The challenge facing Jews and Muslims is that the al-Aqsa Mosque was built on the Temple Mount, which is holy to Jews and Muslims.

Israel allows Muslims unlimited access to that religion's holy structures in Jerusalem and the Temple Mount is under Muslim control. A ramp and passages patrolled by Palestinian guards provide Muslims access to the Dome of the Rock and the al-Aqsa Mosque without requiring them to walk in front of the Western Wall, where Jews are praying. However, because the holy Muslim structures sit literally on top of the holy Jewish structure, the two sets of holy structures cannot be logically divided by a line on a map (Figure 6-70).

▲ **FIGURE 6-70 ISLAM'S JERUSALEM** Palestinian volunteers clean the square in front of the Dome of the Rock prior to the start of the Ramadan festival.

Christianity's Jerusalem

Jerusalem was where Jesus Christ preached and healed people, according to the gospels of Christianity. Jesus's Last Supper, his arrest, his trial, his crucifixion, his entombment, his resurrection, and his ascension were all reported by the gospels to have taken place in or near Jerusalem. The Via Dolorosa (route of suffering) is considered the route that Jesus walked to his crucifixion (Figure 6-71). The route ends at the Church of the Holy Sepulchre, which Christians regard as the location of Jesus's crucifixion and entombment (refer to Figure 6-21).

Pause & Reflect 6.4.4 Why is the Western Wall important in Judaism, and why is the Dome of the Rock important in Islam?

▼ **FIGURE 6-71 CHRISTIANITY'S JERUSALEM** Good Friday procession on the Via Dolorosa, retracing the route taken by Jesus to his crucifixion.

6 Summary & Review

KEY ISSUE

6.1 | Where Are Religions Distributed?

- Religions can be classified into two major categories: universalizing and ethnic.
- The three largest universalizing religions are Christianity, Islam, and Buddhism.
- Christianity predominates in Europe, North America, and Latin America; Islam in Southeast Asia, Central Asia, and Southwest Asia & North Africa; and Buddhism in East Asia.
- The largest ethnic religion is Hinduism, which is found primarily in South Asia.
- Most of the other major religions have clustered distributions.

KEY ISSUE

6.2 | Why Do Religions Have Distinctive Distributions?

- Universalizing religions have well-documented places of origin, based on events in the lives of the founders.
- Ethnic religions typically have unknown or unclear origins.
- Universalizing religions typically diffuse widely from their place of origin, whereas ethnic religions typically do not.
- The contemporary migration patterns of some religious groups vary from the historic distribution of those religions.

KEY ISSUE

6.3 | Why Do Religions Organize Space in Specific Patterns?

- Religious structures, such as churches and mosques, are prominent features of the landscape.
- Some religions have hierarchical administrative structures, whereas others emphasize local autonomy.
- Universalizing religions typically celebrate events in the life of the founder or prophet.
- Ethnic religions are more closely tied to their local physical environment than are universalizing religions.

KEY ISSUE

6.4 | Why Do Territorial Conflicts Arise Among Religious Groups?

- Religious groups have opposed government policies, especially those of communist governments.
- Religious principles seen as representing Western social values have been opposed by groups in Asia.
- An especially long-standing and intractable conflict among religious groups has been centered in Israel/Palestine, an area considered holy by Jews, Christians, and Muslims.

Thinking Geographically

KEY ISSUE

6.1 | Where Are Religions Distributed?

▲ **FIGURE 6CR-1 MUSLIM FAMILY ISTANBUL, TÜRKIYE**

The percentage of the world's people adhering to Islam is forecast by the Pew Research Forum to increase from 23 percent in 2010 to 30 percent in 2050. What demographic factors presented in Chapter 2 Population & Health would underlie this increase? Conversely, why might the percentage who are Christians not be increasing?

KEY ISSUE

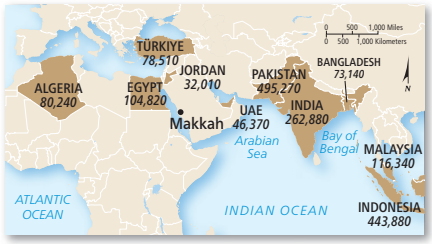
6.2 | Why Do Religions Have Distinctive Distributions?

▲ **FIGURE 6CR-2 EDICULE DURING RENOVATION WORK**

Most Christians accept that Jesus was buried and resurrected from a tomb that is now housed in a shrine called the Edicule inside the Church of the Holy Sepulchre in Jerusalem. In 2016, researchers unsealed the burial site. What did they find? In your Internet browser, search for "Jesus tomb uncovered."

KEY ISSUE

6.3 | Why Do Religions Organize Space in Specific Patterns?



▲ **FIGURE 6CR-3 ORIGINS OF PILGRIMS TO MAKKAH, 2019**

Based on your understanding of reasons for migration discussed in Chapter 3, as well as the distribution of Muslims by country, what factors might account for the distinctive origin of pilgrims?

KEY ISSUE

6.4 | Why Do Territorial Conflicts Arise Among Religious Groups?

▲ **FIGURE 6CR-4 POTALA PALACE, LHASA, RESIDENCE OF THE DALAI LAMA UNTIL 1959**

Three-fourths of the Chinese people adhere to a Chinese traditional religion or are unaffiliated with any religion.

Key Terms

Agnosticism The belief that the existence of God cannot be proven or disproven empirically.

Animism The belief that objects, such as plants and stones, or natural events, like thunderstorms and earthquakes, have a discrete spirit and conscious life.

Atheism The belief that God does not exist.

Autonomous religion A religion that does not have a central authority but shares ideas and cooperates informally.

Branch (of a religion) A large and fundamental division within a religion.

Caste The class or distinct hereditary order into which a Hindu is assigned, according to religious law.

Congregation A local assembly of persons brought together for common religious worship.

Cosmogony A set of beliefs concerning the origin of the universe.

Denomination (of a religion) A division of a branch that unites a number of local congregations into a single legal and administrative body.

Ethnic religion A religion with a relatively concentrated spatial distribution whose principles are likely to be based on the physical characteristics of the particular location in which its adherents are concentrated.

Fundamentalism Literal interpretation and strict adherence to basic principles of a religion (or a religious branch, denomination, or congregation).

Ghetto During the Middle Ages, a neighborhood in a city set up by law to be inhabited only by Jews; now used to denote a section of a city in which members of a group live because of social, legal, or economic discrimination.

Hierarchical religion A religion in which a central authority exercises a high degree of control.

Lunar calendar A calendar with months that correspond to cycles of moon phases.

Lunisolar calendar A calendar with lunar months that are brought into alignment with the solar year through some process.

Missionary An individual who helps to diffuse a universalizing religion.

Monotheism The doctrine of or belief in the existence of only one God.

Pilgrimage A journey to a place considered sacred for religious purposes.

Polytheism Belief in or worship of more than one god.

Secular Attitudes or activities that have no religious or spiritual basis.

Solar calendar A calendar that relates to the season or the apparent position of the sun in relation to the stars.

Solstice An astronomical event that happens twice each year, when the tilt of Earth's axis is most inclined toward or away from the Sun, causing the Sun's apparent position in the sky to reach its northernmost or southernmost extreme, and resulting in the shortest and longest days of the year.

Syncretic Combining several religious traditions.

Universalizing religion A religion that attempts to appeal to all people, not just those living in a particular location.

Utopian settlement A community built around an ideal way of life, often based on a religion.

Varna The traditional caste system in India that once allocated people to one of four social classes.

International Geographic Mapping Explorations

Sacred Spaces: Jerusalem

The Old City of Jerusalem is only 1 square mile and is surrounded by a wall (Figure 6CR-5). Within the Old City are several of the world's most important religious structures in very close proximity to each other, including remaining walls of the ancient Jewish Temple; the Church of the Holy Sepulchre, which Christians regard as the site of the crucifixion, entombment, and resurrection of Jesus; and the Dome of the Rock, which Muslims regard as the place where Muhammad ascended to Heaven for an encounter with God. Connecting these important structures are very narrow streets, some covered rather than open to the sky. The streets of the Old City are for pedestrians only because they are too narrow for cars.

FIGURE 6CR-5 OLD CITY OF JERUSALEM The Dome of the Rock sits atop the Temple Mount. The Western Wall is located to the far right of the photo. The tallest tower in front of the Dome of the Rock is the Lutheran Church of the Redeemer. The large blue dome to the left of the Church of the Redeemer is the Church of the Holy Sepulchre. The walls surrounding the Old City of Jerusalem were constructed in the sixteenth century, replacing older ones that were in ruin.

. . . . An understanding of the geography of religions is essential for understanding the distribution of different groups of people and reasons underlying distinctive spatial patterns. Geographers recognize that people's ethnicities are also important elements of peoples' place-based cultural identities, as we will see in the next chapter, Ethnicities. . . .

7 Ethnicities

KEY ISSUES

7.1 Where Are Ethnicities Distributed?

An ethnic group draws identity and meaning from the physical and cultural features of a particular place where it currently lives or where it once inhabited.

7.2 Why Do Ethnicities Have Distinctive Distributions?

Black Americans have a distinctive ethnic history shaped by forced migration from Africa and enforced segregation within the United States.

7.3 Why Do Ethnicities & Nationalities Differ?

Conflicts may arise among ethnic groups trying to live in the same area. Especially challenging in western Asia is a mismatch between the distribution of ethnicities and nationalities.

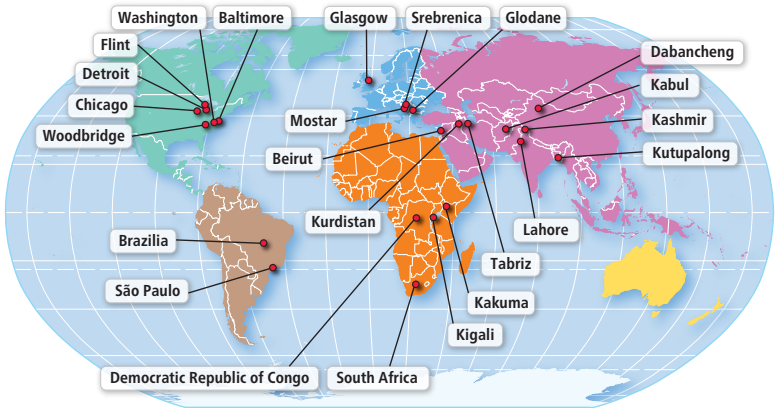
7.4 Why Do Ethnic Cleansing & Genocide Occur?

Conflicts among ethnic groups have sometimes led to mass killings and forced relocation. Recent examples have occurred in Africa, Asia, and Europe.

▶ Celebration of Punjabi culture, Lahore, Pakistan.

Our ethnicity is an important element of our cultural identity. It is a link to the experiences of our ancestors and our cultural traditions. Geographers are especially interested in ethnicity because the concept is place-based. Ethnic identity is rooted in the geography of a particular place on Earth but can remain important even when people live far from the place where their ethnicity originated.

LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

7.1 | Where Are Ethnicities Distributed?

Geographers are interested in where ethnicities, like other elements of culture, are distributed. An ethnic group is tied to a particular place because members of the group—or their ancestors—were born and raised there. The cultural traits displayed by an ethnicity derive from particular conditions and practices in the group's homeland.

Ethnicities & Geography

Learning Outcome 7.1.1 Distinguish between ethnicity and race.

Ethnicity is especially important to geographers because in the face of globalization trends in culture and economy, ethnicity stands as a strong bulwark for the preservation of local diversity. Ethnicity is an important cultural element of local diversity because our ethnic identity is immutable. We can suppress our ethnicity, but we cannot change it in the same way we can speak a new language or practice a different religion. If our parents come from two ethnic groups or our grandparents from four, our ethnic identity may be complex.

Despite efforts to preserve local languages, it is not far-fetched to envision a large percentage of the world's people speaking English or Chinese. And universalizing religions continue to gain adherents around the world. An ethnic group is tied to a particular place because members of the group – or their ancestors – were born and raised there. Consequently, even if globalization results in the disappearance of local languages, religions, and other cultural features, regions of distinct ethnic identity will remain.

The meaning of ethnicity is frequently confused with definitions of race and nationality:

- **Ethnicity** is identity with a group of people who share the cultural traditions of a particular homeland or hearth. An ethnicity could refer to a group occupying a very small area, such as the Tutsis of Central Africa, or it could refer to a large heterogeneous group, such as Hispanic Americans.
- **Race** is identity with a group of people who are perceived to share a physiological trait, such as skin color.
- **Nationality** is identity with a group of people who share legal attachment to a particular country, such as the United States of America.

Ethnicity and *nationality* are concepts of importance to geographers because they are place-based. *Nationality* is discussed in more detail in Chapter 8. Though not place-based, *race* is an important concept to geographers because it is increasingly used as a synonym for *ethnicity* in the United States as well as in other countries.

Presidents Biden, Trump, and Obama illustrate the diversity of ethnic identity in the United States, compared with nationality and race. The nationality of all three is United States of America. The race of Presidents Biden and President Trump is white. President Obama – the son of a white mother and a Black father – identifies as a Black person.

Regarding ethnicity, President Biden identifies as Irish, although his ancestors have lived in the United States for several generations. President Trump identifies as Scottish because his mother immigrated to the United States from Scotland, although his father's parents were both from Germany.

President Obama's ethnicity is more complex. His father, who was born in Kenya, was a member of Kenya's third-largest ethnicity, known as Luo. President Obama's mother was born in Kansas, and most of her ancestors migrated to the United States from England in the nineteenth century. President Obama's stepfather – his mother's second husband – Lolo Soetoro – was born in Indonesia and was a member of Indonesia's most numerous ethnicity, known as Javanese.

Meghan, Duchess of Sussex, also illustrates the complexity of designating ethnicity, race, and nationality (Figure 7-1). Meghan Markle was born with U.S. nationality but became a citizen of the United Kingdom after her marriage to the Duke of Sussex (Prince Harry) and passing a citizenship test. Now known as Meghan, Duchess of Sussex, she identifies her ethnicity as "Caucasian and African American" and her race as "half Black and half white." She has a white father, descended from European ethnicities, and living in Mexico. She has a Black mother, descended from Africans enslaved in Georgia.

The significance of ethnic diversity is challenging in the United States:

- To what extent does discrimination persist against some ethnicities, especially Black and Hispanic Americans?
- Should preferences be given to some ethnicities to correct past patterns of discrimination?
- To what extent should the distinct cultural identity of ethnicities be encouraged or protected?

▼ FIGURE 7-1 DUCHESS AND DUKE OF SUSSEX (MEGHAN MARKLE AND PRINCE HARRY)

Ethnicity & Race

In principle, nationality, race, and ethnicity, are distinct concepts. Nationality refers to a person's country of citizenship, race to a person's biological composition, and ethnicity to a person's place of cultural heritage. In actuality, differences among the three concepts are not always clear-cut. Some individuals are not in a position to identify one or more of their personal traits. For example, an individual's two parents may identify with different ethnicities, races, and nationalities (Figure 7-2). Furthermore, many societies muddle the three concepts, either through unclear language or deliberate decisions.

Features of race, such as skin color, hair type and color, blood traits, and shape of body, head, and facial features, were once thought to be scientifically classifiable. Contemporary geographers, along with other scientists, reject the discredited biological basis of classifying humans into a handful of races because these features are not rooted in specific places.

One feature of race is especially important for geographers: the color of skin. The distribution of persons by skin color is studied by geographers because it is the fundamental basis by which people in many societies sort out where they reside, attend school, spend their leisure time, and perform many other activities of daily life.

At best, biological features are so highly variable among members of a race that any prejudged classification is meaningless. Perhaps many tens or hundreds of thousands of years ago, populations of early "humans" (however they emerged as a distinct species) lived in such isolation from each other that they were truly distinct genetically. But the degree of isolation needed to keep biological features distinct genetically vanished when the first human crossed a river or climbed a hill. The attempt to classify people according to race is regarded by geographers as a social construction, which was defined in Chapter 1 as an idea or a meaning that is widely accepted as natural by a society but may not represent a reality shared by those outside the society.

At worst, biological classification by race is the basis for **racism**, which is the belief that race is the primary determinant of human traits and capacities and that racial differences produce an inherent superiority of a particular race. A **racist** is a person who displays discrimination or feels prejudice against people of particular races.

Trevor Noah, long-time host of *The Daily Show* on Comedy Central, illustrates the complexities of race and ethnicity and the impact of racism (Figure 7-3). Noah's mother Patricia Nombuyiselo Noah was of South African nationality, Black race, and Xhosa ethnicity. His father Robert Noah was of Swiss nationality, white race, and Swiss-German ethnicity. Trevor Noah himself was classified by the South African government as Coloured.

When his parents met in the 1980s, it was illegal in South Africa for different races to date, marry, or have children. So Trevor Noah describes his mere existence "as a crime" under South Africa's laws in effect at the time of his birth, February 1984. After his mother was jailed and fined for her relationship with Noah's father and his father moved back to Switzerland, Noah was raised by African relatives. Today, Noah lives in the United States, though his nationality remains South African.

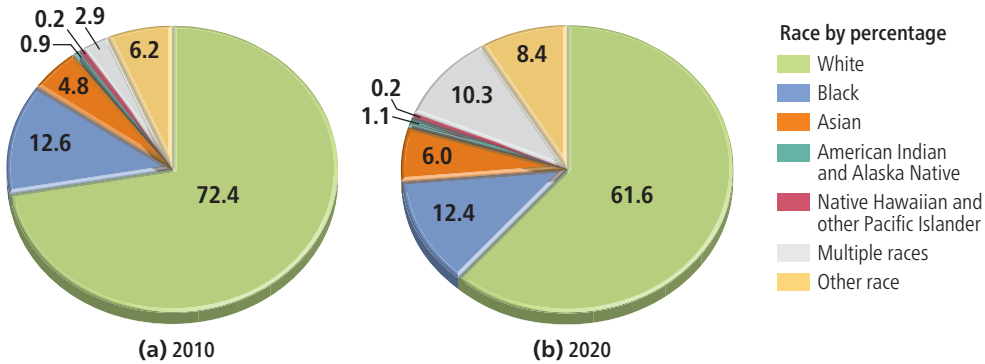
Pause & Reflect 7.1.1 How might children born to the Duke and Duchess of Sussex be considered in terms of race, ethnicity, and nationality?

▲ **FIGURE 7-2 KAMALA HARRIS WITH HER MOTHER, SHYAMALA GOPALAN** Harris is receiving the oath of office as San Francisco District Attorney in 2004. Her mother died in 2009.

▲ **FIGURE 7-3 TREVOR NOAH** An example of the challenges in identifying an individual's race, ethnicity, and nationality.

Classifying U.S. Race & Ethnicity

Learning Outcome 7.1.2 Summarize changes in the classification of race and ethnicity in the United States.



▲ **FIGURE 7-5 RACES IN THE UNITED STATES** (a) 2010, (b) 2020.

The single most important source of data about the characteristics of the people living in a particular place is the **census**, which is a complete enumeration of a population. Information about race and ethnicity in the United States is derived from the Census of Population that is administered every 10 years.

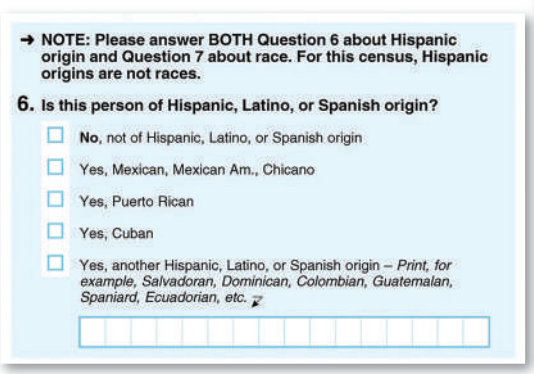
The 2020 U.S. census form shows the difficulty in distinguishing between ethnicity and race (Figure 7-4). The census regards Hispanic American as an ethnicity; in 2020, 18.7 percent of respondents identified themselves as Hispanic. On the other hand, the census regards Asian American as a race even though it is also logically a place-based ethnicity. African American is also a place-based term, whereas Black American would seem to be a race-based term, although it is often used to identify an ethnicity.

Race & the U.S. Census

The U.S. Office of Management and Budget (OMB) requires the U.S. Bureau of the Census to classify people living in the United States into the following races:

- **White:** A person having origins in any of the original peoples of Europe, the Middle East, or North Africa is classified as white. In 2020, 61.6 percent responded that they were *White alone* (Figure 7-5).
- **Black or African American:** A person having origins in any of the Black racial groups is classified as Black or African American. In 2020, 12.4 percent of Americans responded that they were *Black alone*.
- **American Indian or Alaska Native:** A person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment is classified as either American Indian or Alaska Native. In 2020, 1.1 percent of Americans responded that they were *American Indian or Alaska Native alone*.
- **Asian:** A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent is broadly classified as Asian. The 2020 census form offered the distinct classifications of Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, or other Asian. In 2020, 6.0 percent of all respondents selected one of these Asian groups.
- **Native Hawaiian or Other Pacific Islander:** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands is classified as Native Hawaiian or Other Pacific Islander. The 2020 census form offered the distinct classifications of Native Hawaiian, Samoan, Chamorro (indigenous people of Guam), or other Pacific Islander. In 2020, 0.2 percent of all respondents selected one from this group.
- **Some other race:** Respondents were permitted to write in another race on the census form. In 2020, 8.4 percent wrote in another race or origin.
- **Multiple race:** Respondents were permitted to select more than one race on the census form. The percentage of respondents who selected *multiple race* on the census increased from 2.9 percent in 2010 to 10.3 percent in 2020.

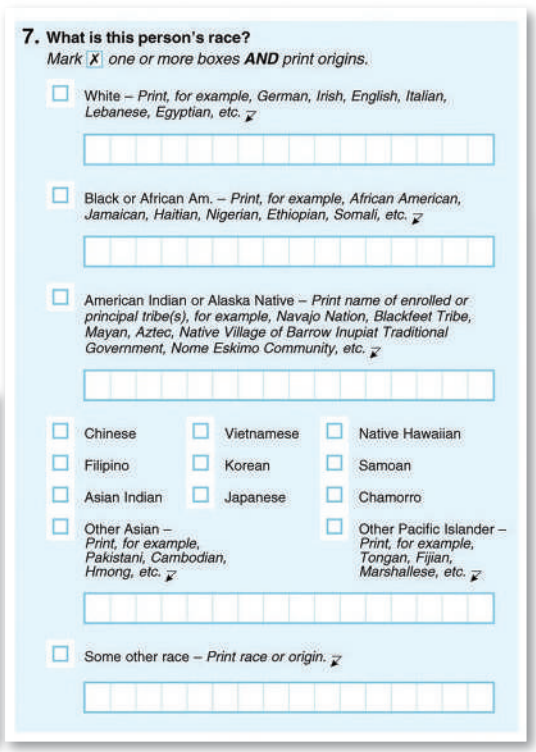
▶ **FIGURE 7-4 2020 ETHNICITY AND RACE QUESTIONS ON THE U.S. CENSUS OF POPULATION**



→ **NOTE: Please answer BOTH Question 6 about Hispanic origin and Question 7 about race. For this census, Hispanic origins are not races.**

6. Is this person of Hispanic, Latino, or Spanish origin?

- ☐ **No**, not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin – *Print, for example, Salvadoran, Dominican, Colombian, Guatemalan, Spaniard, Ecuadorian, etc.*



7. What is this person's race?
Mark X *one or more boxes* ***AND*** *print origins.*

- ☐ White – *Print, for example, German, Irish, English, Italian, Lebanese, Egyptian, etc.*
- ☐ Black or African Am. – *Print, for example, African American, Jamaican, Haitian, Nigerian, Ethiopian, Somali, etc.*
- ☐ American Indian or Alaska Native – *Print name of enrolled or principal tribe(s), for example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community, etc.*
- ☐ Chinese
- ☐ Filipino
- ☐ Asian Indian
- ☐ Vietnamese
- ☐ Korean
- ☐ Japanese
- ☐ Other Asian – *Print, for example, Pakistani, Cambodian, Hmong, etc.*
- ☐ Native Hawaiian
- ☐ Samoan
- ☐ Chamorro
- ☐ Other Pacific Islander – *Print, for example, Tongan, Fijian, Marshallese, etc.*
- ☐ Some other race – *Print race or origin.*

Changing Definitions of Race

A question about race has appeared on every decennial U.S. census of population since the first one in 1790 (Figure 7-6). However, the categories of races have changed nearly every decade. The constant change is a reflection that race is a social construct that is evolving in American society. The Pew Research Center displays the changing census question about race in a chart. Table 7-1 shows some of the changes in identifying persons who are currently classified as *Black or African American*.

An individual's response to the race question is based upon self-identification (Figure 7-7). The 2020 census permitted the selection of more than one race. Today, many Americans are of mixed ancestry and don't choose to identify with a single race or ethnicity. Other Americans trace their heritage to places in Europe, such as Ireland and Italy, that are not included in the two race and ethnicity census questions.

The first three censuses, conducted in 1790, 1800, and 1810, had only three so-called races: free whites, other free persons, and enslaved people. The next three censuses, in 1820, 1830, and 1840, retained the three races but changed "other free" to "free colored." Into the twentieth century, the census included a race called "mulatto," which it defined as a mix of black and another race.

According to a Gallup poll, 18 percent of Black Americans prefer to be called *African American*, 17 percent prefer *Black American*, and 64 percent don't have a preference between the two terms. The term *Black American* is most frequently used now, because it is more expansive and representative of diverse identities than *African American*. The term *African American* is now used when referring specifically to descendants of people who identify their ancestors as African. Some Black Americans do not identify as African Americans because they or their ancestors immigrated to the United States from a region of the world other than Africa, such as from Latin America. *Black* is capitalized, because, according to the Associated Press, "lowercase black is a color, not a person." When referring to a person's identity, *Black* with an upper-case "*B*" is an adjective that is attached to a noun such as *American* or *people*, whereas *black* with a lower-case "*b*" is a noun referring to a color.

People defined by the census as American Indians were added in the mid-nineteenth century, Chinese and Japanese in the late nineteenth century, other Asian so-called "races" in the early twentieth century, and various so-called "races" from Central and South America in the mid-twentieth century. The 1960 census was the first that permitted people to select their own race rather than have it selected for them by the census taker.

The 1980 census was the first that permitted respondents to identify as Hispanic Americans. Hispanic Americans face special challenges in completing the census. Because the census considers *Hispanic* to be an ethnicity, Hispanic Americans also get to identify with any race they wish. Between 2010 and 2020, Hispanic Americans sharply altered their racial self-identification. In 2020, only 20 percent of Hispanic Americans chose to identify as *White*, compared with 53 percent in 2010. Most of the remaining 80 percent of Hispanic respondents in 2020 selected *some other race* or *multiple race*.

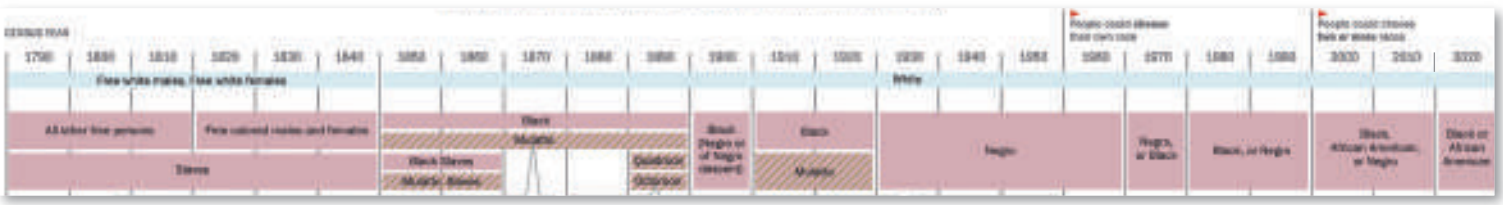
▲ **FIGURE 7-6 SIGN ENCOURAGING PEOPLE TO COMPLETE THE CENSUS FORM**

▲ **FIGURE 7-7 DOOR-TO-DOOR VISITS TO HAVE PEOPLE COMPLETE THE CENSUS**

Pause & Reflect 7.1.2 A large percentage of Hispanic Americans changed their answer concerning race from *White* in 2010 to *some other race* or *multiple race* in 2020. Why might that be the case?

TABLE 7-1 | Changing Definitions of Black and White People in the U.S. Census

The table displays changes over time in the identification of "White" and "Black" Americans.



Distribution of U.S. Ethnicities

Learning Outcome 7.1.3 Compare the distribution of U.S. ethnicities.

Ethnic and racial groups have distinctive distributions within the United States. Black Americans are highly clustered in the Southeast, whereas the other two most numerous ethnic and racial groups – Asian Americans and Hispanic Americans – are clustered in the Southwest.

Descendants of Indigenous Peoples

The descendants of people who lived in North America prior to the arrival of Europeans comprise numerous ethnicities. They are grouped in the United States into three principal ethnic identities: Native American, Alaska Native, and Native Hawaiian. The most numerous are Native Hawaiians, Cherokee, Navajo, Chippewa, Sioux, and Choctaw. The largest numbers of Native Americans, however, do not specify a group.

Indigenous peoples comprise 4 percent of the population of Canada. The Indigenous peoples of Canada are grouped into three main ethnic identities: First Nations, Inuit, and Métis. The Inuit settled in northern Canada around 4,000 years ago. Métis are descendants of indigenous peoples who married Europeans beginning 400 years ago. First Nations, a term for indigenous peoples other than Inuit and Métis, first settled in present-day Canada tens of thousands of years ago.

Native Americans are clustered in the southwest and north-central regions of the United States as well as Alaska. Native Americans exceed 7 percent of the population of Alaska, Oklahoma, New Mexico, and South Dakota (Figure 7-8). Indigenous people occupied much of the land in North America for thousands of years before the first European explorers arrived. Forced migration during the nineteenth century then played a major role in the current distribution of Native Americans.

Black Americans

Black Americans are clustered in the Southeast, where they comprise at least one-fourth of the population in Alabama, Georgia, Louisiana, Maryland, Mississippi, and South Carolina (Figure 7-9). Concentrations are even higher in selected counties. At the other extreme, Black Americans comprise less than 1 percent of the population in Idaho, Montana, and Wyoming.

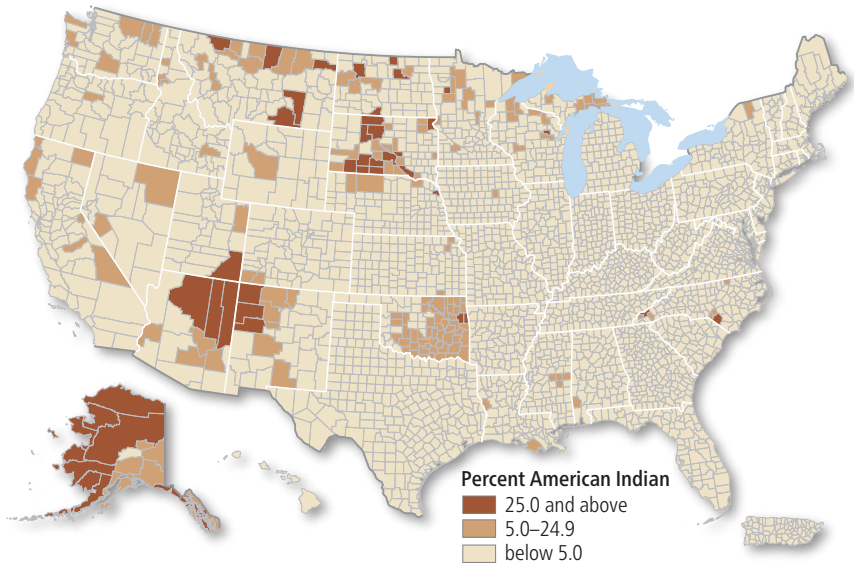
It is difficult to pinpoint precisely the ethnic origins of Black Americans. The ancestors of many Black Americans were captured for enslavement around 300 years ago in areas of Africa that were not yet organized into independent countries. Records were not kept in the United States of the ethnic origin of African people who were enslaved upon arrival.

DNA testing is now helping to narrow the ethnic heritage of many Black Americans. The ancestors of most Black Americans came from three areas in West Africa. The modern-day countries of these three areas are:

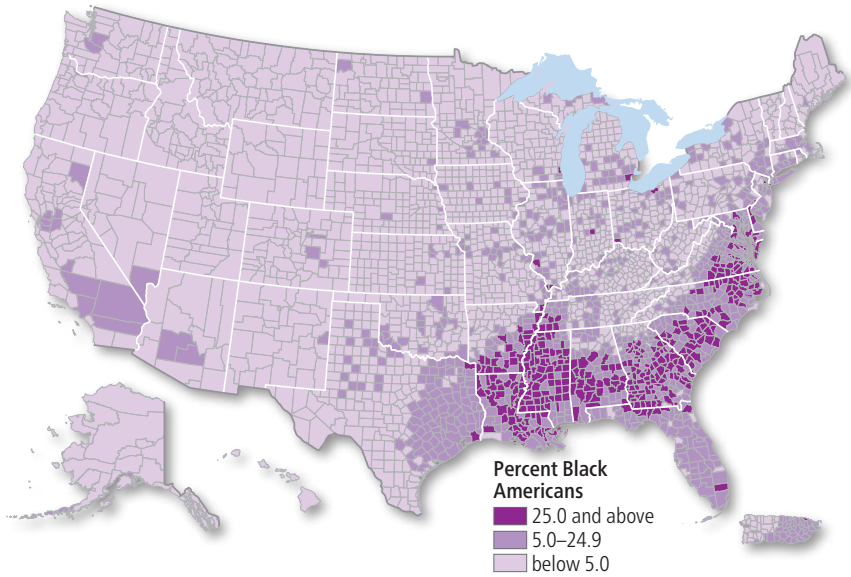
- Senegal, Mali, The Gambia, Guinea, Sierra Leone, and Liberia.
- Togo, Benin, Nigeria, southern Ghana, and southeastern Côte d'Ivoire.
- Angola and western Democratic Republic of Congo.

White Americans

The U.S. Census refers to *Whites* as people having origins in Europe or in Southwest Asia & North Africa. The largest number of white Americans identify their origins as German, followed by Irish, English, Italian, and French.



▲ **FIGURE 7-8 DISTRIBUTION OF AMERICAN INDIAN, ALASKA NATIVE, AND NATIVE HAWAIIAN IN THE UNITED STATES** Native Americans are clustered in the Southwest and north-central states.



▲ **FIGURE 7-9 DISTRIBUTION OF BLACK AMERICANS IN THE UNITED STATES** Black Americans are clustered in the Southeast.

Asian Americans

The term *Asian American* encompasses Americans who trace their heritage to a number of countries in Asia. Only 19 percent of Asian Americans identify their ethnicity as *Asian American*, whereas 62 percent identify their ethnicity as the country of origin of themselves or their ancestors. The largest numbers of Asian Americans identify their or their ancestors' country of origin as China, India, or the Philippines (Figure 7-10).

Asian Americans are clustered in the West, comprising 38 percent of the population of Hawaii. Around 29 percent of all Asian Americans in the United States live in California, where they comprise 15 percent of the population (Figure 7-11).

FIGURE 7-10 ASIAN AMERICAN BY COUNTRY OF ORIGIN Percentages add up to more than 100 percent because individuals identifying with more than one Asian country are included in all countries with which they Identify.

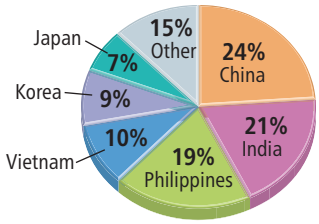
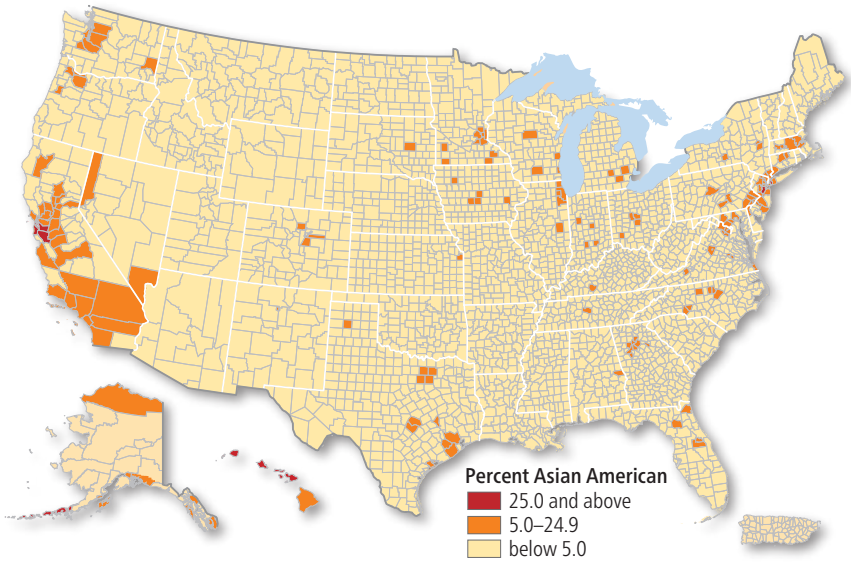


FIGURE 7-11 DISTRIBUTION OF ASIAN AMERICANS IN THE UNITED STATES Asian Americans are clustered in the West.



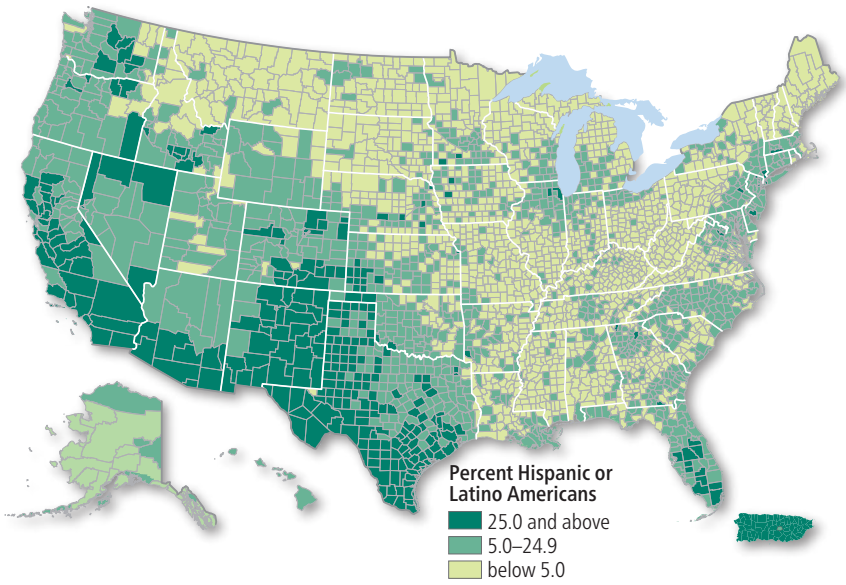
Hispanic Americans

A Hispanic American is a person whose ancestry is a Spanish-speaking country in Latin America. Hispanic Americans are clustered in the Southwest. They exceed one-third of the population of California, New Mexico, and Texas (Figure 7-12). California is home to 12 percent of all Hispanic Americans in the United States, and Texas to 9 percent.

Nearly two-thirds of people classified as Hispanic American came from Mexico. This correlates with the immigration patterns noted in Chapter 3. The second largest group is Puerto Rican (Figure 7-13). Some Hispanic Americans trace their ancestry to people who lived in territory that was part of Mexico and controlled by Spain prior to becoming part of the United States in 1848, following the Mexican-American War.

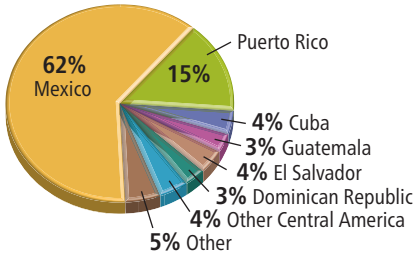
The terms *Latino* (for males) and *Latina* (for females) are generally used interchangeably with *Hispanic*. The U.S. government adopted the term *Hispanic* in 1973 because it was considered an inoffensive label that could be applied to all people from Spanish-speaking countries while avoiding the gender-specific limitation of the terms *Latino* and *Latina*. *Latinx* and *Latino(a)* are used as well as *Hispanic* to avoid gender-specific terms. A 2020 survey by the Pew Research Center found that 61 percent of Americans of Latin American descent prefer the term *Hispanic*, 29 percent prefer *Latino*, 4 percent prefer *Latinx*, and 5 percent prefer something else.

FIGURE 7-12 DISTRIBUTION OF HISPANIC AMERICANS IN THE UNITED STATES Hispanic Americans are clustered in the Southwest, near the Mexico border.



Pause & Reflect 7.1.3 What region of the United States has low concentrations of all four of the ethnicities? Why might that be the case?

FIGURE 7-13 HISPANIC AMERICANS BY PLACE OF ORIGIN



Ethnically Complex Brazil

Learning Outcome 7.1.4 Compare race and ethnicity in Brazil.

Brazil struggles with defining its population by race or ethnicity. Like the United States, Brazil is composed of people whose ancestors emigrated from many places. Portugal and West Africa have been the leading places of origin, but large numbers have come from other European countries, Japan, Southwest Asia, and elsewhere. In addition, a large number of indigenous people inhabited Brazil prior to the emigration of people from other continents.

▲ **FIGURE 7-14 BRAZILIAN SCHOOL CHILDREN, BRASÍLIA**

Brazil's Races & Ethnicities

Genetic studies show that roughly 70 percent of Brazilians have predominantly European ancestry, 20 percent predominantly African ancestry, and 10 percent predominantly indigenous. However, through many generations of marriages and births, most Brazilians have a mix of ethnicities.

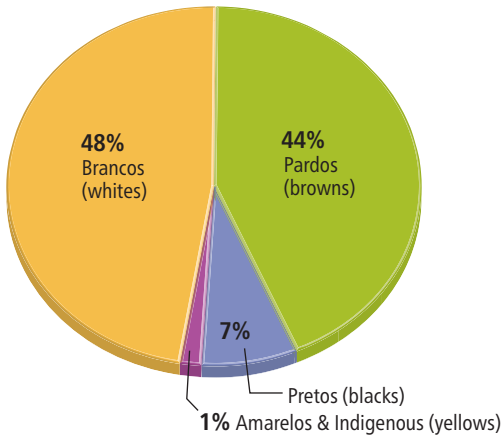
Rather than ethnicity, though, Brazil's census classifies people according to skin color. The race to which a person chooses to be classified is an important element of cultural identity in Brazil (Figure 7-14).

The Brazilian Institute of Geography and Statistics, a government agency that conducts the official census, asks Brazilians to identify themselves as belonging to one of five so-called races: branco (white), pardo (brown), preto (black), amarelo (yellow), and indigenous (Figure 7-15). According to the 2022 census, pardos comprise 48 percent of Brazil's population, brancos 44 percent, pretos 7 percent, and amarelos and indigenous combined less than 1 percent.

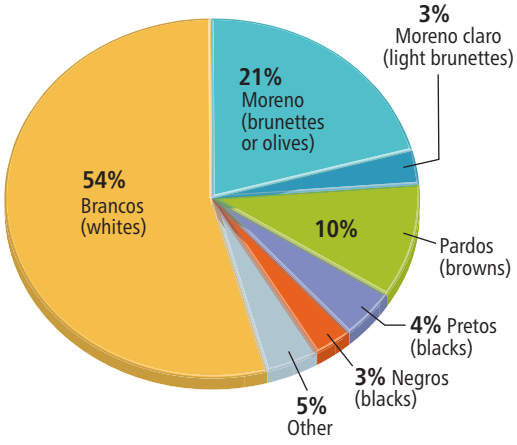
Further complicating Brazil's racial classifications, Brazilian Institute of Geography and Statistics researcher José Luiz Petrucelli found that Brazilians don't care for the census choices. When asked an open-ended question about their race, Brazilians responded with 143 different answers. Most significant were the large numbers who identified themselves as moreno (brunette or olive) or moreno claro (light brown), races not even included in the census (Figure 7-16).

A number of Brazilians also identified with two races that both translate into English as black: preto and negro. On the other hand, few Brazilians considered themselves pardo, which the official census uses for brown. Today, a significant percentage of Brazilians are shifting from their past census selection of branco to self-identification as preto or pardo.

Pause & Reflect 7.1.4 If you had to fill out Brazil's census, what race would you select for yourself? Why?



▲ **FIGURE 7-15 RACES IN BRAZIL BASED ON CENSUS** Official results from 2022 census. Indigenous peoples accounted for less than half of one percent.



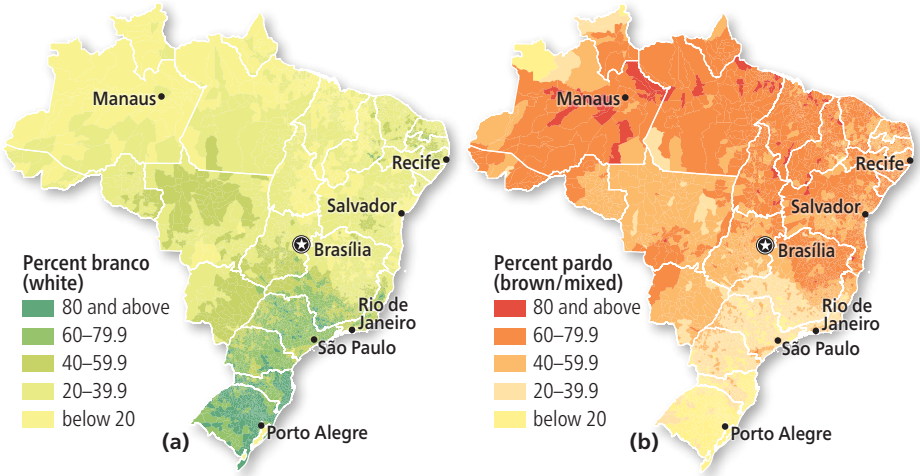
▲ **FIGURE 7-16 RACES IN BRAZIL BASED ON SELF-IDENTIFICATION** Results of a self-identification study by the Brazilian Institute of Geography and Statistics.

Distribution of Races in Brazil

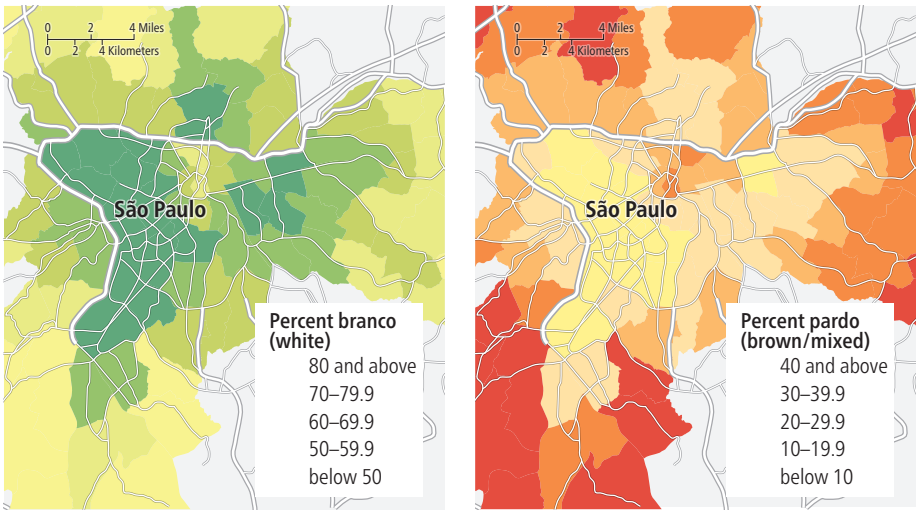
Brazil displays sharp differences in the distribution of races. At a national scale, the country's five regions have clusters of various races (Figure 7-17).

- **South and Southeast.** On a national map of Brazil, brancos are clustered in the south and southeast regions. The two regions, which includes Brazil's two largest cities (São Paulo and Rio de Janeiro), contain around 56 percent of the total population and 72 percent of the brancos. The south was a major destination for immigrants from Portugal during colonial times and from other European countries after independence.
- **North.** Brazil's interior north, which is covered primarily by the Amazon tropical rain forest, has the highest percentage of indigenous people, who are classified by Brazil's census as pardo. Relatively few European immigrants reached the interior.
- **Northeast.** Brazil's northern coast is also populated primarily by persons classified as pardos. The region also received the largest number of pretos forced to migrate from Africa to Brazil for enslavement. The Northeast region contains 28 percent of Brazil's population and 35 percent of its pretos.
- **Center-West.** This region has a mix of pardo and branco population. It was sparsely inhabited until Brasília was constructed in the region to be the capital of Brazil beginning in 1960. Brazilians of all races have migrated to the region to work in the capital.

Local-scale racial diversity in Brazil can also be observed. For example, Figure 7-18 shows the distribution of races in São Paulo, Brazil's largest city. Brancos are clustered closer to the center of the city, whereas pardos are living in outer areas. The racial divide in São Paulo is reflected in the housing (Figure 7-19). Near the center, brancos cluster in modern high-rise apartments, whereas in the outer areas pardos live in poor-quality housing (see Chapter 13). Brazil's racial divide has been a source of both pride and tension (Figure 7-20).



▲ **FIGURE 7-17 DISTRIBUTION OF RACES IN BRAZIL** (a) Branco (white), (b) Pardo (brown/mixed).



▲ **FIGURE 7-18 DISTRIBUTION OF RACES IN SÃO PAULO** (a) Branco (white), (b) Pardo (brown/mixed).

▼ **FIGURE 7-19 SÃO PAULO CONTRASTS** Modern downtown apartment buildings occupied mostly by brancos (background), and poor-quality suburban housing occupied mostly by pardos (foreground).

▼ **FIGURE 7-20 BLACK CONSCIOUSNESS DAY, BRAZIL** November 20 is Black Consciousness Day, a public holiday in Brazil. It honors Brazil's large preto population.

KEY ISSUE

7.2 | Why Do Ethnicities Have Distinctive Distributions?

The clustering of ethnicities within the United States is partly a function of the same process that helps geographers explain the distribution of other cultural factors, such as language and religion—namely migration. In Chapter 3, migration was divided into international (voluntary or forced) and internal (interregional and intraregional). The distribution of Black Americans in the United States provides examples of each of these migration patterns.

Forced Migration from Africa

Learning Outcome 7.2.1 Describe forced migration from Africa.

Most Black Americans are descended from Africans forced during the eighteenth century to migrate to the Western Hemisphere to be enslaved. Most Asian Americans and Hispanic Americans are descended from voluntary immigrants to the United States during the late twentieth and early twenty-first centuries, although some – notably many Vietnamese and Cubans – felt compelled for political reasons to leave their countries.

Slavery

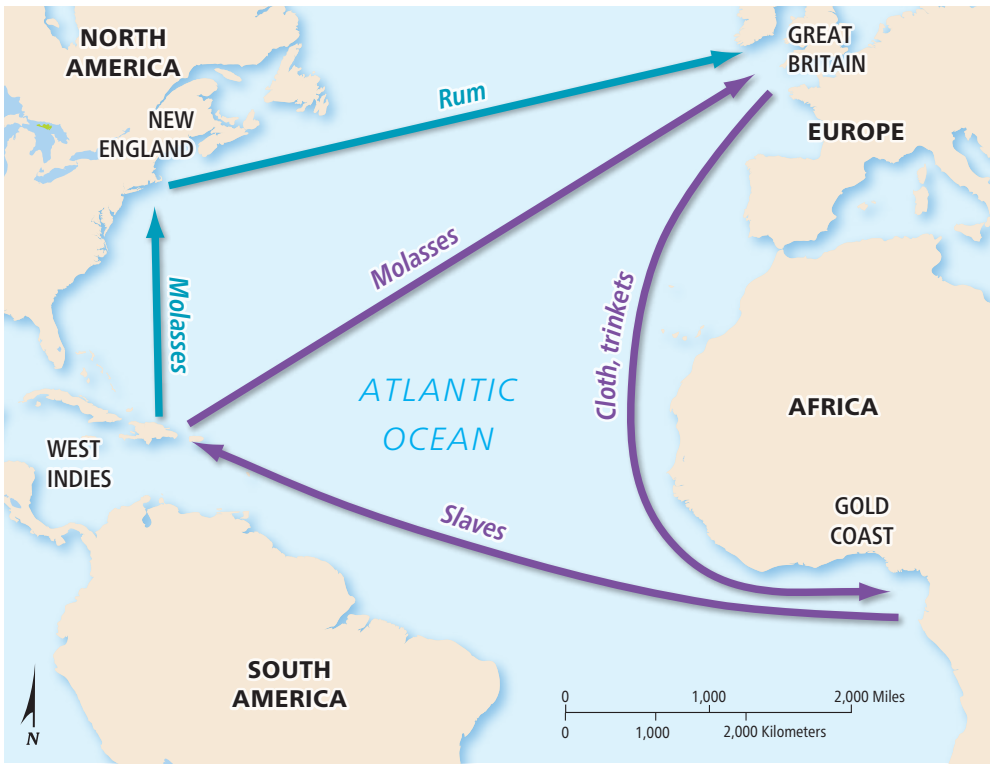
Slavery is a system whereby one person owns another person as a piece of property and can force that enslaved person to work for the owner's benefit. Slavery was widespread during the time of the Roman Empire, about 2,000 years ago. During the Middle Ages, slavery was replaced in Europe by a feudal system, in which laborers working the land (known as serfs) were bound to the land and not free to migrate elsewhere. Serfs had to turn over a portion of their crops to the lord and provide other services as demanded by the lord.

Although slavery was rare in Europe, Europeans were responsible for diffusing the practice to the Western Hemisphere. Europeans who owned large plantations in the Americas turned to African people as an abundant source of labor that cost less to house and feed them than to pay wages to other Europeans.

Between 1525 and 1866, approximately 12.5 million Africans were uprooted from their homes and sent on European ships to be enslaved in the Western Hemisphere. The first Africans brought to the American colonies to be enslaved arrived at Jamestown, Virginia, on a Dutch ship in 1619. During the eighteenth century, the British transported about 400,000 Africans to the 13 colonies that later formed the United States. In 1808 the United States banned bringing in additional Africans to be enslaved, but an estimated 250,000 were illegally imported during the next half-century.

The forced migration began when people living in the interior of Africa were captured and forcibly brought to coastal areas. The raiding expeditions were carried out primarily by Africans living along the east and west coasts, who took advantage of their superior weapons. The captives were sold to Europeans, who then brought the captives to the Americas, where they were sold to be enslaved either on consignment or through auctions. The Spanish and Portuguese first participated in the enslavement trade in the early sixteenth century, and the British, Dutch, and French joined in during the next century.

A number of European countries adopted a trading pattern called the **triangular slave trade** (Figure 7-21). Ships left Europe for Africa with cloth and other goods used to buy people. The same ships transported these enslaved people across the Atlantic. Completing the triangle, the ships returned to Europe with sugar and molasses. Some ships carried molasses from the Caribbean to the North American colonies and rum from the colonies to Europe, forming a rectangular trading pattern.



▲ FIGURE 7-21 TRIANGULAR SLAVE TRADE

Hardships of Forced Migration

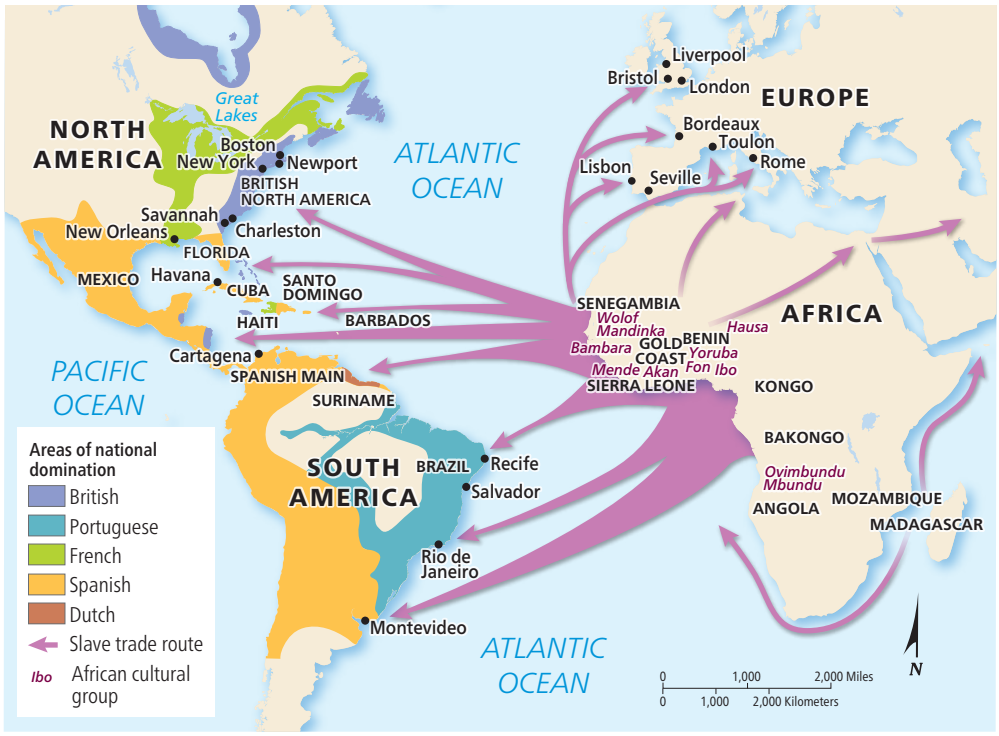
Different European countries operated in various regions of Africa, each sending Africans to different destinations in the Americas (Figure 7-22). Most of the Africans taken by the British to be enslaved went to Caribbean islands, whereas most of the Africans taken by the Portuguese went to Brazil.

The large-scale forced migration of Africans caused them unimaginable hardship, separating families and destroying villages. Traders generally seized the stronger and younger villagers, who could be sold for enslavement at the highest price. The Africans were packed onto ships at extremely high density, kept in chains, and provided with minimal food and sanitary facilities. An estimated 1.8 million of the 12.5 million captured Africans died crossing the Atlantic (Figure 7-23).

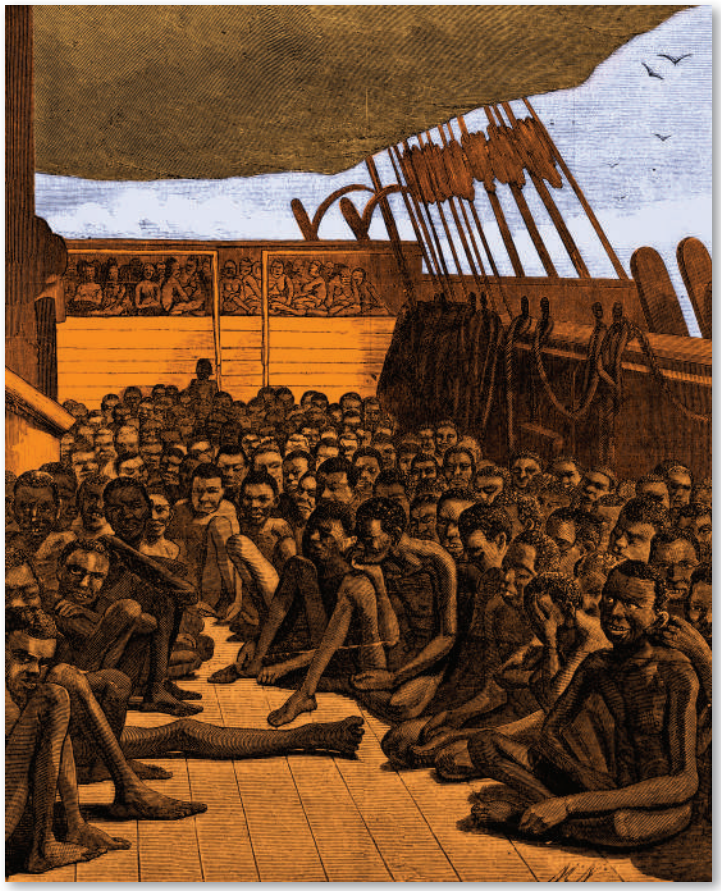
In the 13 colonies that later formed the United States, most of the large plantations in need of labor were located in the South, primarily those growing cotton and tobacco. Consequently, nearly all Africans brought to the 13 colonies ended up in the Southeast.

Attitudes toward slavery dominated U.S. politics during the nineteenth century. During the early 1800s, when new states were carved out of western territory, anti-slavery northeastern states and pro-slavery southeastern states bitterly debated whether to permit slavery in the new states. The Civil War (1861–1865) was fought to prevent 11 pro-slavery Southern states from seceding from the Union. In 1863, during the Civil War, Abraham Lincoln issued the Emancipation Proclamation, freeing the enslaved in the 11 Confederate states. The Thirteenth Amendment to the Constitution, adopted eight months after the South surrendered, outlawed slavery.

Pause & Reflect 7.2.1 Which area of Africa appears to have been the place of origin for most of the people sent to the North American colonies for enslavement?



▲ **FIGURE 7-22 ORIGINS AND DESTINATIONS OF ENSLAVED AFRICANS** Ships sailed from Africa to the Western Hemisphere, from the Americas to Europe, and from Europe to Africa. From Africa, enslaved people and gold were transported to the Western Hemisphere, primarily to the Caribbean islands.



▶ **FIGURE 7-23 SHIP PACKED WITH AFRICANS TO BE ENSLAVED IN THE UNITED STATES, 1860** This drawing, published in *Harper's Weekly,* shows Africans who had been captured near the Congo River and transported to the United States in 1860 to be enslaved—illegally because importing people into the United States to be enslaved had been prohibited since 1807. The ship was captured by an American steamer and brought into the port of Key West, Florida, where the captured Africans were freed. The magazine article's author, who had boarded the ship, counted around 450 Africans, all entirely naked, sitting with their knees elevated to form a resting place for their heads and arms.

Internal Migration of Black Americans

Learning Outcome 7.2.2 Describe the patterns of migration of Black Americans within the United States.

Black Americans displayed two distinctive internal migration patterns within the United States during the twentieth century:

- Interregional migration from the U.S. South to northern cities during the first half of the twentieth century.
- Intraregional migration from the inner city to outer city and inner suburban neighborhoods during the second half of the twentieth century.

The spatial distribution of Black Americans in the twenty-first century reflects the legacy of these two migration patterns.

Interregional Migration

At the close of the Civil War in 1865, most Black Americans were concentrated in the rural South. Today, as a result of interregional migration, many Black Americans live in cities throughout the Northeast, Midwest, and West.

Freed from slavery, most Black Americans remained in the rural South during the late nineteenth century, working as sharecroppers. A **sharecropper** works fields rented from a landowner and pays the rent by turning over to the landowner a share of the crops. To obtain seed, tools, food, and living quarters, a sharecropper gets a line of credit from the landowner and repays the debt with yet more crops. The sharecropper system burdened Black Americans with high interest rates and heavy debts. Instead of growing food that they could eat, sharecroppers were forced by landowners to plant extensive areas of crops such as cotton that could be sold for cash to benefit the landowner.

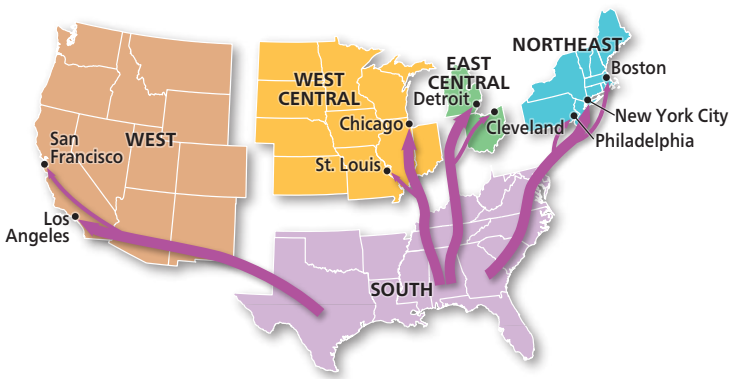
Sharecropping became less common in the twentieth century, as the introduction of farm machinery and a decline in land devoted to cotton reduced demand for labor. At the same time that sharecroppers were being pushed off the farms, they were being pulled by the prospect of jobs in the booming industrial cities of the North.

Black Americans migrated out of the South during the twentieth century along several clearly defined channels (Figure 7-24). Most traveled by bus and car along the major two-lane long-distance U.S. roads that were paved and signposted in the early decades of the twentieth century and have since been replaced by interstate highways:

- **East Coast.** From the Carolinas and other South Atlantic states north to Baltimore, Philadelphia, New York, and other northeastern cities, along U.S. Route 1 (parallel to present-day I-95).
- **East Central.** From Alabama and eastern Tennessee north to either Detroit, along U.S. Route 25 (present-day I-75), or Cleveland, along U.S. Route 21 (present-day I-77).
- **West Central.** From Mississippi and western Tennessee north to St. Louis and Chicago (Figure 7-25), along U.S. routes 61 and 66 (present-day 1-55).
- **Southwest.** From Texas west to California, along U.S. routes 80 and 90 (present-day I-10 and I-20).

Black Americans living in the South migrated to the North and West in two main waves, the first in the 1910s and 1920s before and after World War I and the second in the 1940s and 1950s before and after World War II. The world wars stimulated expansion of factories in the 1910s and 1940s to produce war materiel, while the demands of the armed forces created shortages of factory workers. After the wars, during the 1920s and 1950s, factories produced steel, motor vehicles, and other goods demanded in civilian society.

Pause & Reflect 7.2.2 What were the push and pull factors that motivated the interregional migration of Black Americans in the early decades of the twentieth century?



▲ **FIGURE 7-24 INTERREGIONAL MIGRATION OF BLACK AMERICANS** Migration followed four distinct channels along the East Coast, east-central, west-central, and southwestern regions of the country.

▲ **FIGURE 7-25 MONUMENT TO THE GREAT MIGRATION OF BLACK AMERICANS** Statue by Alison Saar honors Black Americans who migrated to Chicago in the early twentieth century. It stands at the entrance to the Bronzeville neighborhood, the Chicago neighborhood where most Black Americans lived then.

Intraregional Migration

Migration within cities and metropolitan areas – called intraregional migration – changed the distribution of Black people as well other ethnic groups. When they reached the big cities, Black Americans clustered in the one or two neighborhoods where the small numbers who had arrived in the nineteenth century were already living. These areas became known as ghettos, after the term for neighborhoods in which Jews were forced to live in the Middle Ages (see Chapter 6).

Expansion of Neighborhoods of Mostly Black Americans. Black Americans moved from highly clustered communities into adjacent neighborhoods during the 1950s and 1960s. Expansion of areas with mostly Black Americans typically followed major avenues that radiated out from the center of the city.

In Baltimore, for example, most of the city's quarter-million Black Americans in 1950 were clustered in a 3-square-kilometer (1-square-mile) neighborhood northwest of downtown (Figure 7-26). The remainder were clustered east of downtown or in a large isolated housing project on the south side built for Black Americans who were wartime workers in port industries.

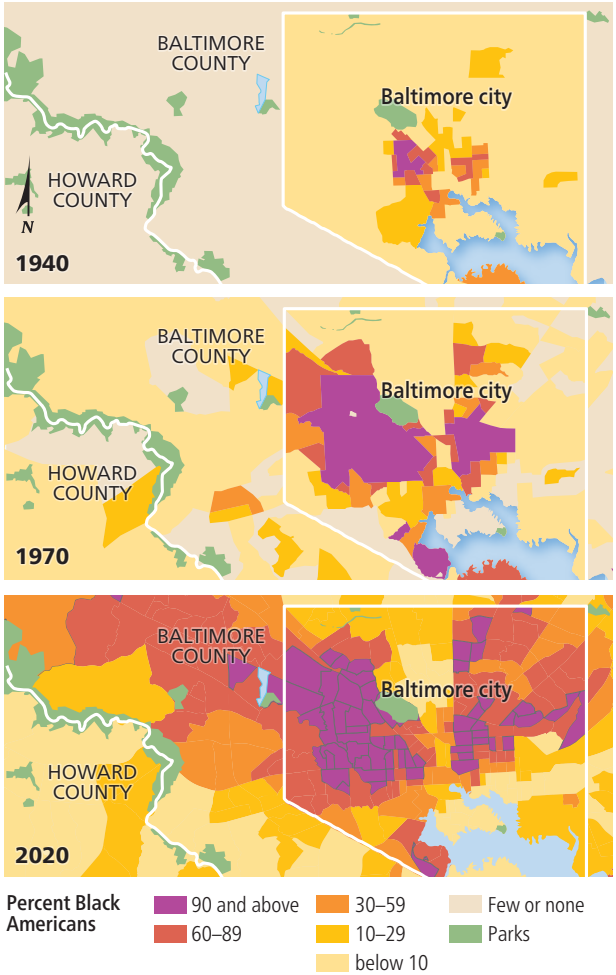
Densities in neighborhoods inhabited mostly by Black people were high in the 1950s and 1960s, with 40,000 inhabitants per square kilometer (100,000 per square mile) common. Contrast that density with the current average in American suburbs of 400 inhabitants per square kilometer (2,000 per square mile). Because of a shortage of housing in the mid-twentieth century in some neighborhoods where most residents were Black Americans, families were often forced to live in one room. Many dwellings lacked bathrooms, kitchens, hot water, and heat.

The portion of Baltimore's west side occupied predominantly by Black Americans expanded from 3 square kilometers (1 square mile) in 1950 to 25 square kilometers (10 square miles) in 1970, and a 5-square-kilometer (2-square-mile) area on the east side became mainly populated by Black Americans. Expansion of the predominantly Black neighborhoods continued to follow major avenues to the northwest and northeast in subsequent decades.

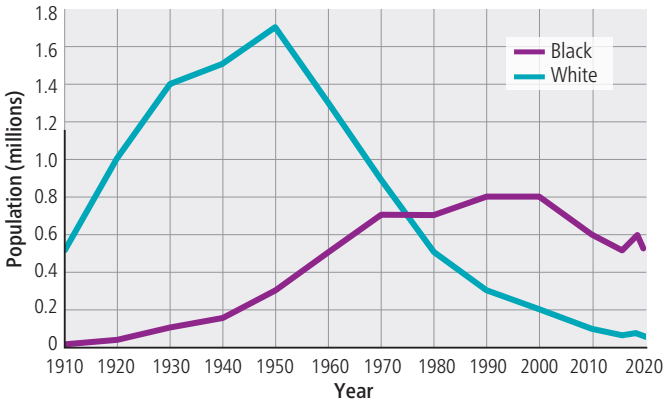
"White Flight." The expansion of areas in American cities occupied primarily by Black Americans was made possible by "white flight," the emigration of white people from an area in anticipation of Black people immigrating into the area. Rather than integrate, white people fled (Figure 7-27).

White flight was encouraged by unscrupulous real estate practices, especially blockbusting and redlining. Under **blockbusting**, real estate agents convinced white homeowners living near mostly Black people to sell their houses at low prices, preying on their fears that Black families would soon move into the neighborhood and cause property values to decline. The agents then sold the houses at much higher prices to Black families desperate to escape overcrowded areas.

Redlining is a process by which financial institutions draw red-colored lines on a map and refuse to lend money for people to purchase or improve property within the lines. Through redlining, Black Americans were prevented from getting mortgages to buy houses in the neighborhoods to which white people fled. Through blockbusting and redlining, a neighborhood could change from being the home of mostly white people to mostly Black people in a matter of months, and real estate agents could start the process all over again in an adjacent neighborhood still occupied mostly by white people.



▲ **FIGURE 7-26 EXPANSION OF BLACK NEIGHBORHOODS IN BALTIMORE**



▲ **FIGURE 7-27 ETHNIC POPULATION CHANGE IN DETROIT** Between 1950 and 2021, the number of white people living in Detroit declined from 1.7 million to 91,000, whereas the number of Black people increased from 300,000 to 488,000.

Ethnic & Racial Segregation

Learning Outcome 7.2.3 Explain the laws once used to segregate races in the United States and South Africa.

In explaining spatial regularities, geographers look for patterns of spatial interaction. A distinctive feature of ethnic relations in the United States and South Africa has been the strong discouragement in the past through legal means of spatial interaction among some groups. Although segregation laws are no longer in effect, their legacy remains fundamental to understanding the geography of ethnicity in both countries.

United States: "Separate but Equal"

The concept of "separate but equal" was upheld by the U.S. Supreme Court in 1896. Louisiana had enacted a law that required Black passengers to ride in separate train cars from White passengers. In *Plessy v. Ferguson*, the Supreme Court stated that Louisiana's law was constitutional because it provided separate, allegedly equal, treatment of white people and persons that the state law and the court decision termed *colored*. Equality did not mean that white people had to mix socially with Black people.

Once the Supreme Court permitted "separate but equal" treatment of races, southern states enacted a comprehensive set of laws to segregate Black people from white people as much as possible (Figure 7-28). These were called "Jim Crow" laws, named for a nineteenth-century song-and-dance act that depicted Black people offensively. During segregation, Black people had to sit in the backs of buses, and shops, restaurants, and hotels could choose to serve only white people. Segregated schools were established to separate Black students from white students. Segregation offered equality, White southerners argued, because buses got Black people sitting in the rear to destinations at the same time as the white people sitting in the front, Black people could patronize commercial establishments that served only Black people, and Black people could educate their children in separate schools.

Throughout the country, not just in the South, house deeds contained restrictive covenants that prevented the owners from selling to Black people, as well as to Roman Catholics or Jews in some places. Restrictive covenants also kept Black people from moving into neighborhoods where mostly white people lived. And because schools, especially at the elementary level, were located to serve individual neighborhoods, most were segregated in practice, even if not by legal mandate.

U.S. Civil Rights Movement

The landmark Supreme Court decision *Brown v. Board of Education of Topeka*, in 1954, found that maintaining separate schools only for white people and only for people that the state law and court decision termed *Negro* was unconstitutional because no matter how equivalent the facilities, racial separation sent a false message that white children were somehow superior. Therefore, the court ruled, segregation was inherently unequal. A year later, the Supreme Court further ruled that schools had to be desegregated "with all deliberate speed."

A nationwide movement in favor of civil rights forced elimination of U.S. segregation laws during the 1950s and 1960s (Figure 7-29). Civil Rights Acts during the 1960s outlawed racial discrimination.

Pause & Reflect 7.2.3 More than 50 years after the Civil Rights Acts, why might schools in cities like Baltimore and Detroit still be racially segregated (refer to Figures 7-26 and 7-27)?

▲ **FIGURE 7-28 SEGREGATION IN THE UNITED STATES** Until the 1960s in the U.S. South, Black people had to use separate drinking fountains from those used by white people as well as separate restrooms, bus seats, hotel rooms, and other public facilities.

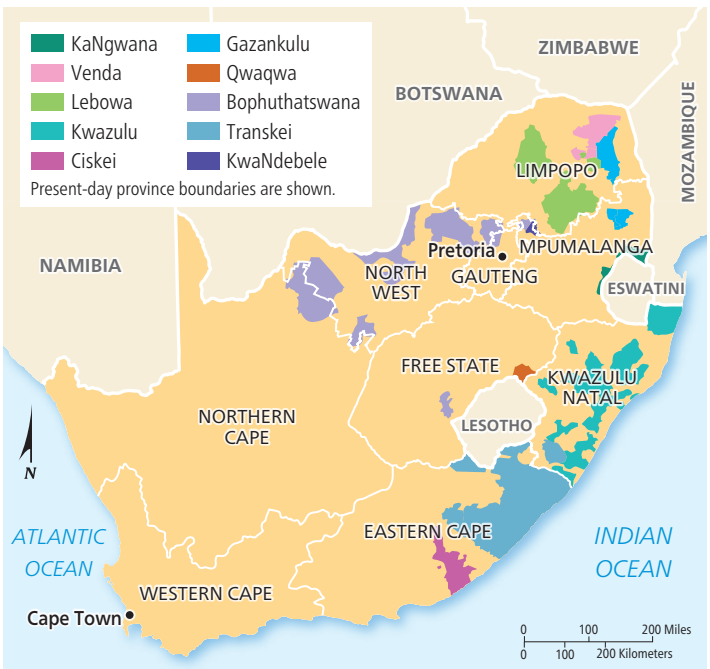
▲ **FIGURE 7-29 CIVIL RIGHTS MARCH, WASHINGTON, D.C., 1969**

South Africa: Separate Development

Discrimination by race reached its peak in the late twentieth century in South Africa. The cornerstone of the South African policy was the creation of **apartheid**, which was the legal separation of races into different geographic areas. Under apartheid, a newborn baby was classified as being one of four government-designated races – Black, White, Coloured (mixed race), or Asian (mostly Indian). In 2021, an estimated 81 percent of South Africans were classified Black, 9 percent Coloured, 8 percent White, and 2 percent Asian.

To ensure geographic isolation and separate development of these groups, the South African government designated 10 so-called homelands for Black people (Figure 7-30). The White minority government expected every Black South African to become a citizen of one of the homelands and to move there. More than 99 percent of the population in the 10 homelands were Black. The apartheid laws determined where different races could live, attend school, work, shop, use the bathroom (Figure 7-31), travel (Figure 7-32), and own land. Black South Africans were restricted to certain occupations and were paid far lower wages than were White South Africans for similar work. They could not vote or run for political office in national elections.

The apartheid system was created by descendants of Whites who arrived in South Africa from the Netherlands in 1652 and settled in Cape Town, at the southern tip of the territory. They were known either as Boers, from the Dutch word for "farmer," or Afrikaners, from the word *Afrikaans*, the name of their language, which is a dialect of Dutch. The British seized the Dutch colony in 1795 and controlled South Africa's government until 1948, when the Afrikaner-dominated Nationalist Party won elections. The Afrikaners vowed to resist pressures to turn over South Africa's government to Blacks, and the Nationalist Party created the apartheid laws in the next few years to perpetuate White dominance of the country.



▲ **FIGURE 7-30 SOUTH AFRICA'S APARTHEID HOMELANDS** As part of its apartheid system, the government of South Africa designated 10 homelands, expecting that ultimately every Black would become a citizen of one of them. South Africa declared four of these homelands to be independent countries, but no other country recognized the action. With the end of apartheid and the election of a Black majority government, the homelands were abolished, and South Africa was reorganized into nine provinces.

▲ **FIGURE 7-31 APARTHEID IN SOUTH AFRICA: BATHROOMS** Separate bathrooms for people other than Whites, 1977.

The White-minority government of South Africa repealed the apartheid laws in 1991. The principal anti-apartheid organization, the African National Congress, was legalized, and its leader, Nelson Mandela, was released from jail after more than 27 years of imprisonment for anti-apartheid activism. When all South Africans were permitted to vote in national elections for the first time, in 1994, Mandela was overwhelmingly elected the country's first Black president.

Though South Africa's apartheid laws have been repealed, the legacy of apartheid will linger for many years. Black South Africans have achieved political equality, but they are much less financially secure than White South Africans. For example, South Africa is a major producer of wine, but only a small number of wineries have Black owners.

▲ **FIGURE 7-32 APARTHEID IN SOUTH AFRICA: TRAINS** During apartheid, passenger trains had separate cars for Whites and for the other races.

Black Lives Matter

Learning Outcome 7.2.4 Describe contemporary patterns of racial discrimination and segregation in the United States.

The legacy of racial discrimination and segregation is still felt in the United States. Many Black Americans, recent immigrants, and Americans of other ethnicities remain clustered in urban neighborhoods because of economic and cultural factors. In urban schools, Black Americans are now often the majority after white people move away.

Racism on the Landscape

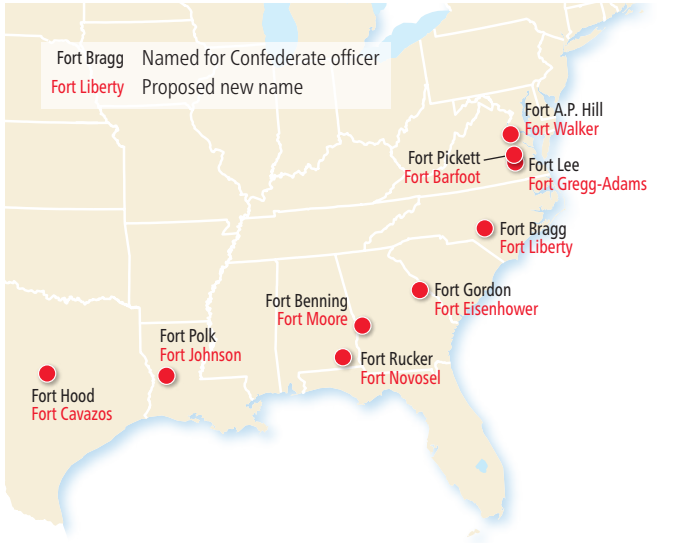
In February 1861, seven states announced that they were seceding from the United States and forming an independent Confederate States of America (CSA). When the Civil War started two months later, four more states joined the CSA. CSA Vice President Alexander Stephens declared at the time that the CSA was formed "upon the great truth that the negro is not equal to the white man; that slavery, subordination to the superior race, is his natural and normal condition."

In the decades after the Civil War, more than 1,500 statues were erected to honor the CSA. Schools, parks, and other features of the landscape were named for CSA leaders. Most of the CSA memorials were added around 1900, at the time of the creation of the Jim Crow laws. For example, the Jefferson Davis Highway was planned in the 1910s and 1920s as a transcontinental route between the East and West Coasts, traversing most of the Confederate states. The road was named for the President of the Confederate States. Portions of the road exist today (Figure 7-33). In recognition of the racist attitudes of the CSA leaders, an estimated 230 monuments honoring the CSA were removed in 2020 and 2021, leaving 723 remaining, according to the Southern Poverty Law Center. The U.S. Congress created a commission in 2021 to rename military assets which have names associated with the CSA. The Commission has found 758 Defense Department items with ties to the Confederacy, including streets and buildings. New names have been selected for nine forts (Figure 7-34).

Environmental Racism in Flint

A recent example of environmental racism is the contamination of the drinking water in Flint, Michigan. Flint's residents, of whom 54 percent are Black people, have been exposed to a high concentration of lead in the drinking water because of insufficient treatment of the water source. The crisis started in 2014 when Flint changed its source of water during a budget crisis. Instead of continuing to buy Lake Huron water from Detroit, the city switched to Flint River water.

◀ **FIGURE 7-33 JEFFERSON DAVIS HIGHWAY** Woodbridge, Virginia.



▲ **FIGURE 7-34 MILITARY ASSETS RENAMED TO REMOVE NAMES ASSOCIATED WITH THE CONFEDERACY** Fort Benning is renamed for Lt. Gen. Hal Moore and Julia Moore (who was responsible for changing the way that families are notified of a soldier's death). Fort Hill is renamed for Mary Walker, who was the only woman to receive the U.S. Medal of Honor for her work treating wounded civilians during the Civil War. Fort Hood is renamed for Gen. Richard Cavazos, who was the U.S. Army's first Hispanic American four-star General. Lt. Fort Lee is renamed for Gen. Arthur Gregg, who was one of the highest ranking Black American officers, and for Lt. Col. Charity Adams, who was the first Black American in the Women's Army Auxiliary Corps. Fort Pickett is renamed for Van Barfoot, who received the Medal of Honor for his actions during the Allied Invasion of Italy in World War II. Polk is renamed for William Henry Johnson, a Black man, who was posthumously awarded the Purple Heart and the Distinguished Service Cross for his service during World War I. Fort Rucker is renamed for Michael J. Novosel, Sr., who was awarded the Medal of Honor for his leadership during the Vietnam War.

After the switch to the Flint River, city residents began complaining about the color, taste, and odor of their water. But public officials asserted that the water met health and safety standards, an assertion that turned out to be false. Public officials have faced legal charges of negligence for endangering the health of the citizens of Flint in order to save money. A 2017 court order required the City of Flint to replace all lead pipes in the city. The city has excavated around 27,000 pipes, and more than 10,000 water-carrying lead pipes have been replaced (Figure 7-35).

▼ **FIGURE 7-35 REPLACING LEAD WATER PIPES IN FLINT**

Diffusion of Black Lives Matter

Black Lives Matter (BLM) is a decentralized political and social movement protesting incidents of police brutality and other racially motivated violence against Black people. The BLM movement campaigns against perceived racism toward Black people and educates others about the challenges that Black people continue to face in the United States.

The hashtag #BlackLivesMatter first appeared in social media in 2013 after the acquittal of a white man, George Zimmerman, in the shooting death of a Black teen, Trayvon Martin, in Sanford, Florida. Widespread street protests started the following year after a Black man, Michael Brown, was fatally shot by a white police officer, Darren Wilson, in Ferguson, Missouri, and another Black man, Eric Garner, died in a prohibited chokehold by a white police officer, Daniel Pantaleo, in New York. The movement has since protested the deaths of numerous other Black Americans through police actions.

The movement gained strength and widespread support nationally in 2020 following the death of a Black man, George Floyd, at the hands of a white police officer, Derek Chauvin, in Minneapolis. Protests demanding criminal justice reform erupted in several hundred U.S. cities, involving between 15 million and 26 million people, making it one of the largest protest movements in U.S. history.

Washington, D.C., has renamed part of the street outside the White House Black Lives Matter Plaza (Figure 7-36). For his use of excessive force, failing to comply with Minneapolis Police procedures during the arrest of Floyd, and consciously risking and ultimately taking Floyd's life, Chauvin was convicted of second- and third-degree murder and second-degree manslaughter.

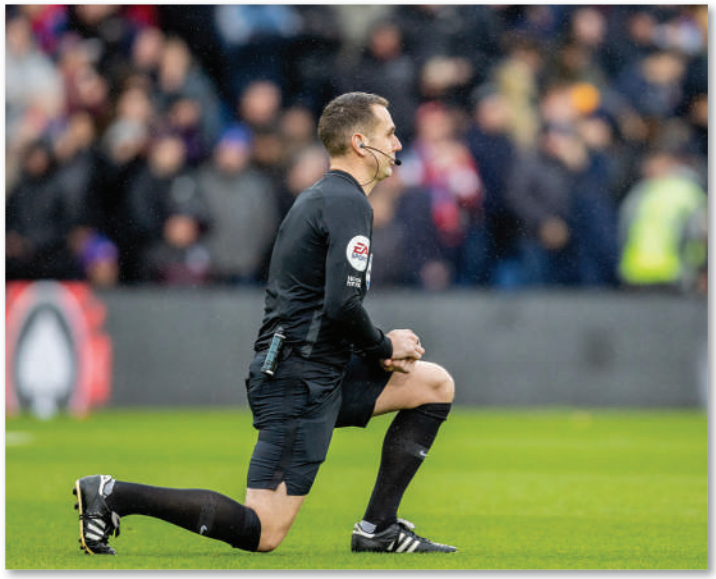
BLM has diffused from the United States to other countries, in part to show solidarity with demonstrators in the United States and in part to recognize that issues of racism and discrimination are present in many countries. For example, BLM originated in the United Kingdom in 2016 with demonstrations in several cities protesting police brutality and marking the fifth anniversary of the death of Mark Duggan, a Black man, who was killed by police in London under circumstances that were not made clear by the police nor through legal action. Numerous protests were held across the world in 2020 in response to the killing of George Floyd.

BLM has received support from professional sports around the world, including Major League Baseball (Figure 7-37), England's Premier League soccer (Figure 7-38), and the National Basketball Association (Figure 7-39).

▼ **FIGURE 7-36 BLACK LIVES MATTER: WASHINGTON, D.C.**

▼ **FIGURE 7-37 NATIONALS PARK, WASHINGTON, D.C.**

▼ **FIGURE 7-38 REFEREE DAVID COOTE KNEELS IN RESPECT OF BLACK LIVES MATTER BEFORE START OF A BRITISH PREMIER LEAGUE SOCCER MATCH** February 2022.



▼ **FIGURE 7-39 KEVIN GARNETT** as a member of the Brooklyn Nets, 2014.

KEY ISSUE

7.3 | Why Do Ethnicities & Nationalities Differ?

Nationality was defined at the beginning of this chapter as identity with a group of people who share legal attachment and personal allegiance to a particular country. In principle, the cultural values shared with others of the same nationality derive from voting, obtaining a passport, and performing civic duties, whereas those shared with others of the same ethnicity derive from religion, language, and material culture. However, this distinction is not always clear.

Ethnicities & Nationalities

Learning Outcome 7.3.1 Explain differences between ethnicity and nationality.

Sorting out ethnicity and nationality can be challenging for many individuals. Consider professional soccer player Sydney Leroux (Figure 7-40). Leroux has a white mother, whose nationality is Canadian. Leroux has a Black father, whose nationality is the United States of America. Because of her parents, Leroux holds dual nationality, and she has been eligible to play soccer for either the United States or Canada. At various times, she has played for teams representing Canada and teams representing the United States.

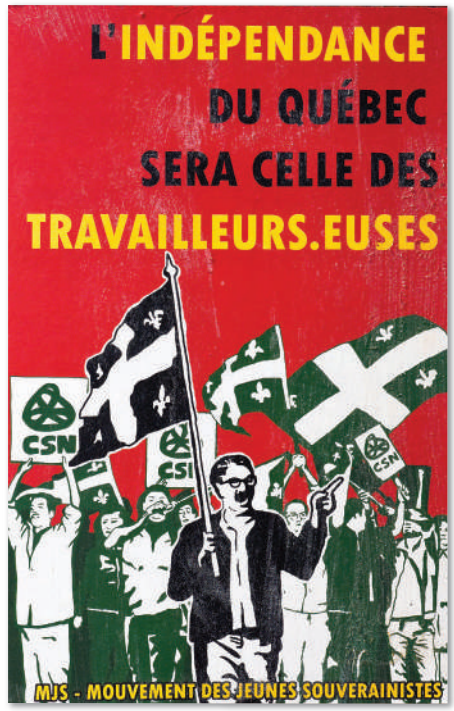
Leroux was married for six years to professional soccer player Dom Dwyer, who was born a citizen of the United Kingdom to parents who had emigrated from Jamaica. In 2017, Dwyer became a U.S. citizen and also holds dual citizenship. Their son Cassius, born in 2016, also has multiple nationalities.

▼ **FIGURE 7-40 SYDNEY LEROUX** As a member of the Orlando Pride, 2022.

Ethnicity & Nationality in North America

Nationality is generally kept reasonably distinct from ethnicity and race in common usage in the United States:

- Nationality identifies citizens of the United States of America, including those born in the country and those who immigrated and became citizens.
- Ethnicity identifies groups with distinct ancestry and cultural traditions, such as Mexican Americans, Chinese Americans, or Polish Americans.



▲ **FIGURE 7-41 POSTER IN SUPPORT OF QUÉBEC INDEPENDENCE**

In Canada, the distinction between ethnicity and nationality is less clear and more controversial. Québécois are clearly distinct from other Canadians in cultural traditions, especially language. But do the Québécois form a distinct ethnicity within the Canadian nationality or a second French-speaking nationality separate altogether from English-speaking Canadians? The distinction is critical because if Québécois is recognized as a separate nationality from English-speaking Canadians, the Québec government would have a much stronger justification for breaking away from Canada to form an independent country (Figure 7-41).

Nationalism

Nationalism is loyalty and devotion to a nationality. Nationalism typically promotes a sense of national consciousness that exalts one nation above all others and emphasizes its culture and interests as opposed to those of other nationalities. People display nationalism by supporting a country that preserves and enhances the culture and attitudes of their nationality. States foster nationalism by promoting symbols of the country, such as flags and songs.

Nationalism is an important example of a centripetal force, which was defined in Chapter 5 as an attitude that tends to unify people and enhance support for a state. (The word *centripetal* means "directed toward the center"; it is the opposite of *centrifugal*, which means "to spread out from the center.") Most countries find that the best way to achieve citizen support is to emphasize shared attitudes that unify the people.

Ethnicity & Nationality in the British Isles

An example of the challenges in distinguishing between ethnicities and nationalities is the British Isles, which comprise 136 inhabited islands. Two islands – Ireland and Great Britain – comprise 92 percent of the land area and contain 99 percent of the population. Sorting out the inhabitants of the British Isles into nationalities has become controversial.

The British Isles are divided between two countries – the Republic of Ireland and the United Kingdom (known officially as the United Kingdom of Great Britain and Northern Ireland). The Republic of Ireland comprises the southern 83 percent of the island of Ireland (called Eire in Irish), and the United Kingdom comprises Great Britain and the northern 17 percent of Eire. The United Kingdom is divided into four main parts: England, Northern Ireland, Scotland, and Wales (Figure 7-42).

The nationality of the citizens of the Republic of Ireland is clearly Irish. However, the nationality of the citizens of the United Kingdom is disputed. Does the United Kingdom contain one nationality (called British)? Or does it contain four nationalities – English, Scottish, Welsh, and the Irish of Northern Ireland?

- **English.** The English are descendants of Germanic tribes who crossed the North Sea and invaded the country in the fifth century. These invasions were summarized in Chapter 5 in the discussion of the origin of the English language.
- **Welsh.** The Welsh were Celtic people conquered by England in 1283 and formally united with England through the Act of Union of 1536. Welsh laws were abolished, and Wales became a local government unit.
- **Scots.** The Scots were Celtic people who had an independent country for more than 700 years, until 1603, when Scotland's King James VI also became King James I of England, thereby uniting the two countries. The Act of Union in 1707 formally merged the two governments, although Scotland was allowed to retain its own systems of education and local laws.

FIGURE 7-42 COMPONENTS OF THE BRITISH ISLES The British Isles comprise two countries: the Republic of Ireland (Eire) and the United Kingdom.

- **Irish.** The Irish were Celtic people who were ruled by England until the twentieth century, when most of the island became the independent country of Ireland. The northern portion remained part of the United Kingdom.

International sports organizations permit each of the four parts of the United Kingdom to field its own separate national soccer team in major tournaments, such as the World Cup. The most important annual international rugby tournament, known as the Guinness Six Nations Championship, includes teams from England, Scotland, and Wales as well as from the Republic of Ireland, Italy, and France (Figures 7-43 and 7-44). Given the history of English conquest, the other nationalities often root against England when it is playing teams from other countries.

The government of the United Kingdom has established separate governments for Northern Ireland, Scotland, and Wales. The government of Scotland exercises considerable authority, whereas the one in Wales has much less authority. Scots voted in 2014 to remain part of the United Kingdom, but many Scots continue to support an independent Scotland (Figure 7-45).

Pause & Reflect 7.3.1 What are some examples of centripetal forces that help to hold the United Kingdom together as one nation in spite of the nationalistic aspirations of some of its ethnicities?

FIGURE 7-43 SCOTLAND FANS AT A RUGBY MATCH BETWEEN WALES AND SCOTLAND

FIGURE 7-44 WALES FANS AT A RUGBY MATCH BETWEEN WALES AND SCOTLAND

FIGURE 7-45 SCOTTISH INDEPENDENCE RALLY Glasgow, Scotland.

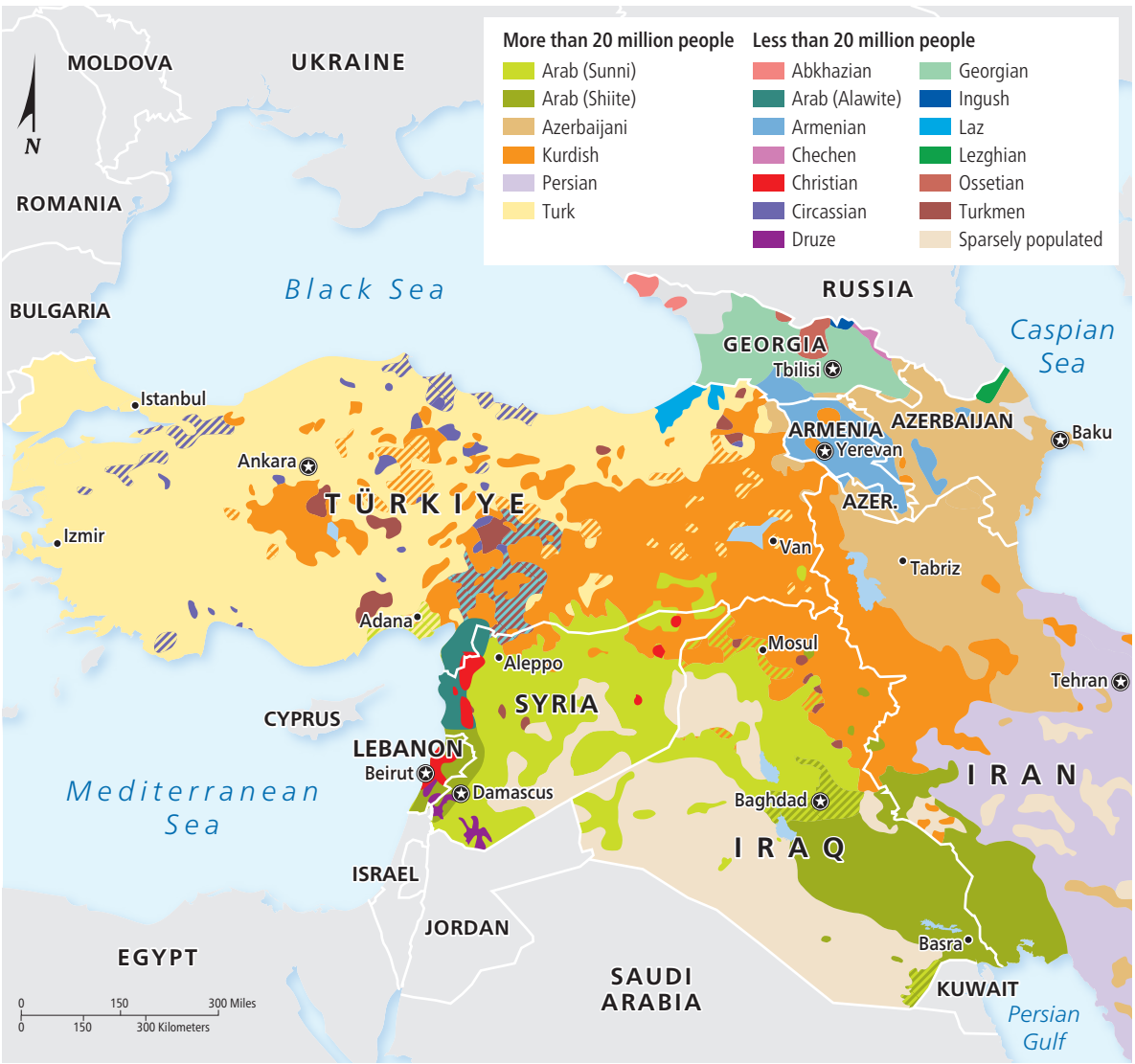
Ethnic Diversity in Western Asia

Learning Outcome 7.3.2 Identify the principal ethnicities and nationalities in Western Asia.

Few ethnicities inhabit an area that precisely matches the territory of a nationality. The lack of correspondence between the territories occupied by ethnicities and by nationalities is especially severe in Western Asia and West-central Asia. Western Asia has been the center of long-standing conflicts among ethnicities. Ethnic diversity is intermixed with religious diversity, as discussed in Chapter 6. The region has also experienced military intervention by outsiders. The terrorist organization Islamic State is also an important source of conflict in the region, as discussed in Chapter 8.

Figure 7-46 depicts the diversity of ethnicities in Western Asia. The most numerous ethnicities in Western Asia are Turks, Persians, Sunni Arabs, Shiite Arabs, Azerbaijanis, and Kurds. Numerous other ethnicities appear on the map of Western Asia. Some groups self-identify their ethnicity through what is in reality a religious affiliation.

FIGURE 7-46 ETHNICITIES IN WESTERN ASIA



Ethnicities in Türkiye

The Republic of Türkiye was created in the 1920s to encompass the territory inhabited by ethnic Turks. Turks are predominantly Sunni Muslims and speak Turkish, a Turkic language. Ethnic Turks are descended from people who migrated to present-day Türkiye around 1,000 years ago, most likely from Siberia.

People who identify themselves as ethnic Turks comprise approximately 80 percent of the population of Türkiye. Most of the remaining population of Türkiye are Kurds, who are clustered in the eastern portion of the country. The Turkish government has requested the change in spelling from Turkey, because Türkiye more closely reflects the "culture, civilization and values of the Turkish nation in the best way," according to the country's president.

Ethnicities in Iraq

Iraqi Arabs are descended from Arabs who immigrated in ancient times from the Arabian Peninsula and mingled with peoples already living in the area known then as Mesopotamia. Iraqi Arabs comprise two-thirds of Iraq's population, but they are divided between the two most numerous branches of Islam—Shiite and Sunni. Iraqi Shiites are more numerous but claim a history of discrimination at the hands of Iraqi Sunnis since the 1930s.

As President (1979–2003), Saddam Hussein, a Sunni, violently suppressed Shiite and Kurdish movements from seeking autonomy within Iraq. The United States led an attack against Iraq in 2003 that resulted in the removal and death of Saddam Hussein. Having invaded Iraq and removed Hussein from power, the United States became embroiled in a complex and violent struggle among ethnicities.

Ethnicities in Iran

Most people in Iran are ethnic Persians, who comprise 54 percent of Iran's population. Persians are predominantly Shiite Muslims who speak Farsi (also known as Persian), a language in the Indo-Iranian branch of the Indo-European language family (Figure 7-47). Iran's other principal ethnicities include 16 percent Azerbaijanis in the northwest, 10 percent Kurds in the west, 7 percent Gilaks and Mazandaranis (two closely related ethnicities) in the north, 6 percent Lurs in the west, and 7 percent other ethnicities.

Relations between Iran and the United States have been poor since 1979, when a revolution brought to power fundamentalist Shiites and some of their supporters seized the U.S. Embassy, holding 52 Americans hostage for more than a year. More recently, other countries have struggled to keep Iran from creating nuclear weapons (discussed in more detail in Chapter 8).

Ethnicities in Azerbaijan

Azerbaijanis are predominantly Shiite Muslims and speak Azerbaijani, a Turkic language. They trace their roots to Turkish invaders who migrated from Central Asia in the eighth and ninth centuries and merged with the existing Persian population.

Approximately 8 million ethnic Azerbaijanis live in Azerbaijan, where they comprise more than 80 percent of the country's population. However, nearly twice as many Azerbaijanis – around 15 million – actually live in Iran rather than in Azerbaijan.

Ethnicities in Syria

Ethnicities in Syria are defined primarily by religion. Around three-fourths of Syrians are ethnic Arabs who speak Arabic and follow the Sunni branch of Islam. Around 10 percent of Syrians are Alawites, a form of Shiite Islam; Alawites are clustered in the northwestern portion of the country. Christians account for around 10 percent of Syrians; the most numerous Christian denominations are Greek Orthodox and Greek Catholic.

Syria's government has been controlled since 1963 by the minority Alawites, including Hafez al-Assad (President 1971–2000) and his son Bashar al-Assad (President beginning in 2000). The Alawites have exercised control through suppression of the rights of the majority Sunni Muslim population as well as the other religious groups. As a result, a civil war has raged in the country since 2011, pitting the Alawite-controlled government against other groups. Complicating Syria's civil war have been Russian military intervention and the presence of the Islamic State terrorists, who have seized control over a portion of the country.

Ethnicities in Lebanon

Lebanon is divided among around 48 percent Muslims (divided about equally between Sunnis and Shiites), 45 percent Christians (primarily Maronite, which is a self-governing church allied with Roman Catholicism), and 5 percent Druze. The Druze are sometimes classified as Muslims, but they do not follow Islam's five pillars of faith described in Chapter 6 and therefore do not self-identify as Muslims. Lebanon's Christians and Muslims consider themselves ethnically distinct from each other. The Christians regard themselves as descendants of the ancient Phoenicians who once occupied present-day Lebanon, whereas the country's Muslims are regarded as ethnically Arab. Lebanon's Constitution officially recognizes 18 religions and requires that each be represented in the Chamber of Deputies, including equal numbers of Christians and Muslims.

Lebanon's religious groups have tended to live in different regions of the country. Sunnis live primarily in the north and the major cities, including Beirut and Tripoli (Figure 7-48). Shiites are concentrated in the south. Maronites are concentrated in center of the country.

Pause & Reflect 7.3.2 How do religious differences complicate the ethnic conflicts in the countries of Western Asia? Which country is an exception in this respect? Explain.

▲ **FIGURE 7-47 SIGNS IN FARSI** Tabriz, Iran.

▲ **FIGURE 7-48 ETHNIC DIVERSITY IN LEBANON** Street signs in multiple languages, Beirut, Lebanon.

Ethnic Diversity in West-Central Asia

Learning Outcome 7.3.3 Identify the principal ethnic conflicts in West-Central Asia.

Dozens of ethnicities inhabit a 4-million-square-kilometer (1.5 million-square-mile) region of West-Central Asia, allocated among eight nationalities (Figure 7-49). The five most numerous ethnicities in West-central Asia are Punjabis, Persians, Pashtuns, Uzbeks, and Azerbaijanis. As is the case in Western Asia, the distribution of ethnicities in West-Central Asia and the distribution of nationalities in West-Central Asia do not match.

Ethnicities in the Caucasus

The Caucasus region, an area about the size of Colorado, was once part of the Soviet Union. The breakup of the Soviet Union resulted in independence for the small former Soviet republics of Armenia, Azerbaijan, and Georgia (see Chapter 8).

Armenians have inhabited this territory since prehistoric times. All but 2 percent of the population of Armenia are ethnic Armenians. Most speak Armenian, which is a branch of the Indo-European language family (see Chapter 5), and most adhere to Orthodox Christianity.

Azerbaijanis comprise more than 90 percent of the population of Azerbaijan. They trace their roots to Turkish invaders who migrated from Central Asia during the eighth and ninth centuries and merged with the existing Persian population. Azerbaijanis are predominantly Shiite Muslims and speak Azerbaijani, a Turkic language. Azerbaijan and Armenia have fought several wars over a predominantly Armenian enclave inside Azerbaijan. The disputed territory declared itself an independent country called Artsakh, but other countries consider it part of Azerbaijan.

Ethnic Georgians comprise 87 percent of Georgia's population. The country also includes about 6 percent Azerbaijanis and 5 percent Armenians. Georgia's cultural diversity has been a source of unrest, especially among two ethnic groups known as Ossetians and Abkhazians. In 2008, Russia recognized Abkhazia and South Ossetia as independent countries and sent troops there to bolster its claim. Only a handful of other countries recognize the independence of Abkhazia and South Ossetia, although the two operate as if they were independent of Georgia.

Pause & Reflect 7.3.3 Compare Armenia, Azerbaijan, and Georgia in terms of ethnic diversity. Which has recently experienced the most ethnic conflict? Explain.

FIGURE 7-49 ETHNICITIES IN WEST-CENTRAL ASIA

Ethnicities in Afghanistan

The most numerous ethnicity in Afghanistan is the Pashtuns, who comprise 42 percent of the country's population. The Pashtuns have inhabited this region since prehistoric times. Cultural unity has come primarily from speaking various dialects of Pashto, a language in the Indo-Iranian branch of the Indo-European family (see Chapter 5). Most Pashtuns have practiced Islam since the arrival of that religion in the area in the seventh century.

In addition to the Pashtun, Afghanistan's other most numerous ethnicities include 27 percent Tajik and 9 percent each Hazara and Uzbek. Pashtuns are concentrated in the south, Tajiks in the northeast, Hazaras in the center, and Uzbeks in the north. Afghanistan's ethnic diversity can be attributed to its position as a key trading route between Central, Southern, and Western Asia.

The current unrest among Afghanistan's ethnicities dates from 1979, with the start of a rebellion by several ethnic groups against the government. After many years of infighting among ethnicities, a Pashtun faction called the Taliban gained control over most of the country in 1995. The Taliban imposed strict laws on Afghanistan, according to Islamic values as the Taliban interpreted them. The United States invaded Afghanistan in 2001 and overthrew the Taliban-led government because it was harboring terrorists. Removal of the Taliban unleashed a new struggle for control of Afghanistan among the country's many ethnicities. The Taliban regained control of Afghanistan in 2021 (Figure 7-50) and, once again, imposed strict laws according to its interpretation of Islamic values. As a result of the fighting in Afghanistan, more than 4 million people have become refugees or internally displaced persons.

Ethnicities in Pakistan

The Punjabi people, who comprise 45 percent of Pakistan's population, have been the most numerous ethnicity since ancient times in the territory that now constitutes the state of Pakistan (Figure 7-51). *Punjabi* is a term applied around 200 years ago to people of varying cultural heritages inhabiting the Punjab region of South Asia. A distinct ethnic identity was forged initially through sharing the Punjabi language, which is classified in the Indo-Iranian branch of Indo-European family (see Chapter 5). When the independent countries of India and Pakistan were created in 1947, the boundary between the countries divided the Punjabis, with around two-thirds living in Pakistan and one-third in India.

Other major ethnicities in Pakistan include 15 percent Pashtuns, 14 percent Sindhis, 8 percent each Saraikis and Muhajirs, and 4 percent Balochis. Pakistan's principal ethnicities are distinguished by speaking different languages in the Indo-Iranian branch of Indo-European (see Chapter 5). Punjabis, Muhajirs, Saraikis, and Sindhis are clustered in eastern regions of Pakistan, whereas Pashtuns and Balochis are in the west.

Pakistan's western border with Afghanistan was imposed by the British in the 1890s before either was an independent country. The border, called the Durand line, is named for the British diplomat principally responsible for setting the line. The Durand line, which is not recognized by the government of Afghanistan, is a source of tension because it divides the Pashtun and Baloch ethnic groups between the two countries.

Ethnicities in Central Asia States

The five states in Central Asia carved out of the former Soviet Union display varying degrees of ethnic diversity. Tajiks, Turkmens, and Uzbeks comprise more than 80 percent of the population of Tajikistan, Turkmenistan, and Uzbekistan, respectively; and Kazakhs and Kyrgyz around 70 percent of Kazakhstan and Kyrgyzstan, respectively. Conflicts among these ethnicities have occurred primarily between Uzbeks and Kyrgyz (see Chapter 8).

▼ **FIGURE 7-50 PASHTUN, KABUL, AFGHANISTAN** Taliban fighters patrol the streets of Kabul after regaining control of the country in 2021.

▼ **FIGURE 7-51 PUNJABI, LAHORE, PAKISTAN** Demonstration in support of more use of the Punjabi language.

Dividing Ethnicities Among Multiple Nationalities

Learning Outcome 7.3.4 Describe examples of how ethnicities have been divided among more than one nationality.

Few ethnicities inhabit an area that matches the territory of a nationality. Ethnicities are sometimes divided among more than one nationality. Two examples can be found in western Asia and in South Asia.

Dividing the Kurds

The most prominent example of an ethnicity divided among several countries in western Asia is the Kurds, who live in an area comprising parts of eastern Türkiye, western Iran, and northern Syria and Iraq. The Kurds are the most numerous ethnicity in western Asia who do not constitute a majority in any country in the region. The Kurds are Sunni Muslims who speak a language in the Iranian group of the Indo-Iranian branch of the Indo-European language family (see Chapter 5) and have distinctive literature, dress, and other cultural traditions.

When the victorious European allies carved up the Ottoman Empire after World War I, they created an independent state of Kurdistan to the south and west of Van Gölü (Lake Van) under the 1920 Treaty of Sèvres. Before the treaty was ratified, however, the Turks, under the leadership of Mustafa Kemal (later known as Kemal Ataturk), fought successfully to expand the territory under their control beyond the small area the allies had allocated to them. The Treaty of Lausanne in 1923 established the modern state of Türkiye, and three years later the League of Nations determined that much of Kurdistan would become part of Türkiye.

Today around 35 million Kurds are split among several countries; 15 million live in eastern Türkiye, 8 million in western Iran, 7 million in northern Iraq, 2 million in Syria, 2 million in Europe, and 1 million elsewhere in the world. Kurds comprise 18 percent of the population in Türkiye, 10 percent in Iran, 18 percent in Iraq, and 10 percent in Syria (Figure 7-52).

To foster the development of Turkish nationalism, the Turks have tried repeatedly to suppress Kurdish culture. Use of the Kurdish language was illegal in Türkiye until 1991, and laws banning its use in broadcasts and classrooms remain in force. Kurdish nationalists, for their part, have waged a guerrilla war since 1984 against the Turkish army.

Iraq's Kurds have made several unsuccessful attempts to gain independence, including in the 1930s, 1940s, and 1970s. A few days after Iraq was defeated in the 1991 Gulf War, the country's Kurds launched another unsuccessful rebellion. The United States and its allies decided not to resume their recently concluded fight against Iraq on behalf of the Kurdish rebels, but after the revolt was crushed, they sent troops to protect the Kurds from further attacks by the Iraqi army. After the United States attacked Iraq and deposed Saddam Hussein in 2003, Iraqi Kurds achieved even more autonomy. The Kurdistan Region Parliament governs northern Iraq, with little control exercised by the Iraqi national government. However, a 2017 referendum calling for independence of Iraqi Kurdistan was rejected by Iraq's national government, even though 93 percent of Kurdish voters supported it (Figure 7-53).

▲ **FIGURE 7-52 KURDISTAN** The area on the map is the territory that Kurds wish to consolidate into an independent Kurdistan.

Pause & Reflect 7.3.4 Explain why an independent state of Kurdistan would be opposed by the governments of Iran, Iraq, Syria, and Türkiye.

▼ **FIGURE 7-53 WELCOME TO KURDISTAN** Pope Francis and former President of Kurdistan Region of Iraq Masoud Barzani welcome visitors to Kurdistan in English.

Ethnicities in South Asia

South Asia provides vivid examples of what happens when independence comes to colonies that contain two major ethnicities. When the British ended their colonial rule of the Indian subcontinent in 1947, they divided the colony into two irregularly shaped countries – India and Pakistan (Figure 7-54). Pakistan comprised two noncontiguous areas, West Pakistan and East Pakistan, 1,600 kilometers (1,000 miles) apart, separated by India. East Pakistan became the independent state of Bangladesh in 1971. An eastern region of India was also practically cut off from the rest of the country, attached only by a narrow corridor north of Bangladesh that is less than 13 kilometers (8 miles) wide in some places.

The basis for separating West and East Pakistan from India was ethnicity and religion. The people living in the two areas of Pakistan were predominantly Muslim; those in India were predominantly Hindu. Antagonism between the two religious groups was so great that the British decided to place the Hindus and Muslims in separate states. Hinduism has become a great source of national unity in India. In modern India, with its hundreds of languages and ethnic groups, Hinduism has become the cultural trait shared by the largest percentage of the population.

Muslims have long fought with Hindus for control of territory, especially in South Asia. After the British took over India in the early 1800s, a three-way struggle began, with the Hindus and Muslims fighting each other as well as the British rulers. Mahatma Gandhi, the leading Hindu advocate of nonviolence and reconciliation with Muslims, was assassinated in 1948, ending the possibility of creating a single state in which Muslims and Hindus could live together peacefully.

The partition of South Asia into two states resulted in massive migration because the two boundaries did not correspond precisely to the territory inhabited by the two ethnicities. Approximately 17 million people caught on the wrong side of a boundary felt compelled to migrate during the late 1940s. Some 6 million Muslims moved from India to West Pakistan and about 1 million from India to East Pakistan. Hindus who migrated to India included approximately 6 million from West Pakistan and 4 million from East Pakistan. As they attempted to reach the other side of the new border, some Hindus in Pakistan and Muslims in India were killed by people from the rival religion. Extremists attacked small groups of refugees traveling by road and halted trains to massacre the passengers.

Pakistan and India never agreed on the location of the boundary separating the two countries in the northern region of Kashmir (Figure 7-55). Since 1972, the two countries have maintained a "line of control" through the region, with Pakistan administering the northwestern portion and India the southeastern portion. Muslims, who comprise a majority in both portions, have fought a guerrilla war to secure reunification of Kashmir, either as part of Pakistan or as an independent country. India blames Pakistan for the unrest and vows to retain its portion of Kashmir. Pakistan argues that Kashmiris on both sides of the border should choose their own future in a vote, confident that the majority Muslim population would break away from India.

India's ethnic composition is further complicated by the presence of 28 million Sikhs, who were not given their own independent country when India was partitioned. Although they constitute only 2 percent of India's total population, Sikhs comprise a majority in the Indian state of Punjab, situated south of Kashmir along the border with Pakistan.

▲ **FIGURE 7-54 ETHNIC DIVISION OF SOUTH ASIA** In 1947, British India was partitioned into two independent states, India and Pakistan, which resulted in the forced migration of an estimated 17 million people. The creation of Pakistan as two territories nearly 1,600 kilometers (1,000 miles) apart proved unstable, and in 1971, East Pakistan became the independent country of Bangladesh.

▲ **FIGURE 7-55 KASHMIR** India and Pakistan dispute the location of their border in the Kashmir region.

KEY ISSUE

7.4 | Why Do Ethnic Cleansing & Genocide Occur?

The fear of others sometimes forces the migration of ethnic groups. Throughout history, ethnic groups have been forced to flee from other ethnic groups' more powerful armies. In the most extreme cases, hatred of other ethnicities can result in ethnic cleansing and genocide.

Ethnic Cleansing in Asia

Learning Outcome 7.4.1 Describe examples of ethnic cleansing and genocide in Asia.

The United Nations defines **ethnic cleansing** as a purposeful policy designed by one ethnicity or religious group to remove by violent and terror-inspiring means the civilian population of another ethnic or religious group from certain geographic areas. **Genocide** is the mass killing of a group of people in an attempt to eliminate the entire group from existence. Fear of people of a particular ethnicity is **ethnophobia**. It can overlap with **xenophobia**, which is fear of people who are from other countries. Extreme ethnophobia and xenophobia can result in ethnic cleansing and genocide.

Ethnic cleansing and genocide are especially important for cultural geography because they change the spatial distribution of ethnicities, and they do so through force and criminal violence. These violent and calculated processes are undertaken to rid an area of an entire ethnicity so that the surviving ethnic group can be the sole inhabitants of an ethnically homogeneous region. The point is not simply to defeat an enemy or to subjugate them, as was the case in traditional wars. Rather than a clash between armies of male soldiers, ethnic cleansing and genocide involve the removal of every member of the less powerful ethnicity—women as well as men, children as well as adults, the frail elderly as well as the strong youth. In recent years, instances of ethnic cleansing and genocide have occurred in Asia, Africa, and Europe.

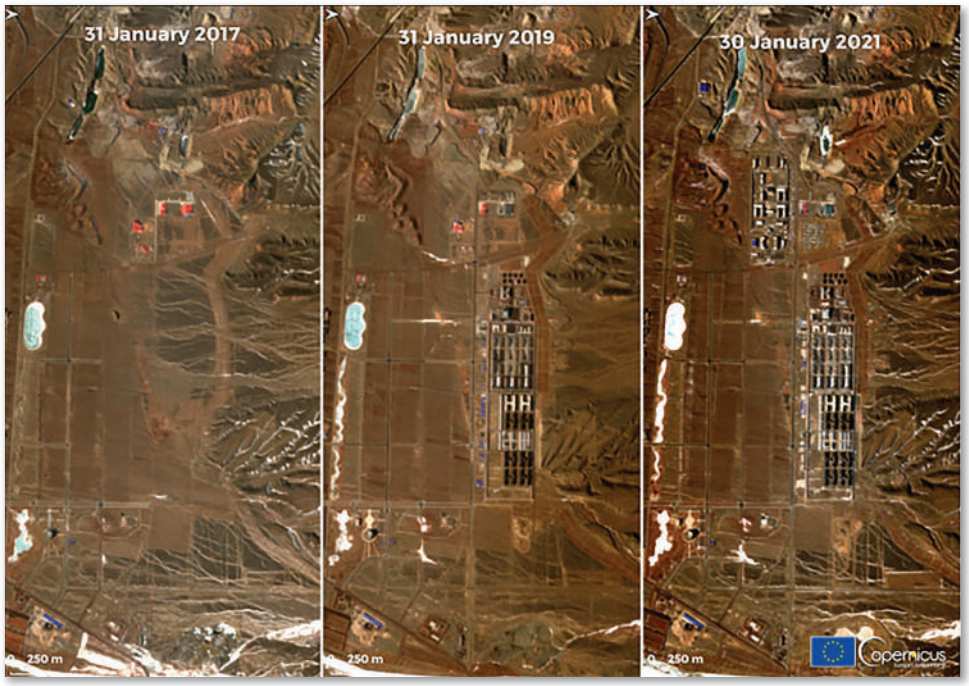
Ethnic Cleansing of Uyghurs

In Asia, an extensive example of ethnic cleansing is the forced removal of the Uyghurs in China. Uyghurs are ethnic Turks clustered primarily in Xinjiang Uyghur Autonomous Region, in Western China. More than 1 million of the 12 million Uyghurs in Xinjiang are reported by independent observers to have been placed in a network of detention centers across the region, according to the U.S. State Department.

Former detainees allege they were subjected to indoctrination, sexually abused, and in some cases forcibly sterilized. In other cases, they were bused away from their villages and families and forced to work in factories.

China denies allegations of human rights abuses. China's government calls the centers where Uyghurs have been placed Vocational Education and Training Centers (Figures 7-56 and 7-57). The government says the centers are necessary to prevent religious extremism and terrorism.

▲ **FIGURE 7-56 FACILITY FOUND BY INTERNATIONAL OBSERVERS TO BE A DETENTION CENTER FOR UYGHURS** Dabancheng, China.



▶ **FIGURE 7-57 AIR PHOTO OF UYGHUR DETENTION CENTER** Dabancheng, China.

Ethnic Cleansing & Genocide in Myanmar

Asia's most extreme example of ethnic cleansing and genocide in recent years has been in Myanmar, a country of 55 million inhabitants. The attacks have been directed against the Rohingya, an ethnic group living in Myanmar's far western Rakhine State (Figure 7-58). Rakhine is the least economically developed state in Myanmar, which in turn is one of the world's least economically developed countries.

The Rohingya are predominantly Sunni Muslims who speak an Indo-European language. In contrast, the largest number of people in Myanmar are Theravada Buddhists who speak Sino-Tibetan languages (see Chapter 5).

Most Rohingya migrated in the nineteenth century from present-day Bangladesh to present-day Myanmar, when both were British colonies. The Myanmar government claims that because the Rohingya immigrated during the British colonial era, they are living in Myanmar illegally. In 1982, the Myanmar government enacted laws that took away the Rohingya's rights to hold citizenship, own land, attend school, and hold jobs.

In 2016, Rohingya attacked some police and military posts. In retaliation, the Myanmar military launched a massive ethnic cleansing operation against the Rohingya. The pretext was to eliminate the group that had attacked the police and military, but the United Nations concluded that more than 1 million Rohingya have been ethnically cleansed. Their villages have been destroyed, and they have been forced to move from Rakhine to other countries, primarily Bangladesh (Figure 7-58).

According to the United Nations, the attacks against the Rohingya led by the Myanmar military have included massacres, mass killings, looting and then burning of villages, and sexual violence including gang rapes. Throughout the region in their attempts to reach safety, Rohingya also fall victim to human trafficking and smugglers.

The government of Myanmar issued directives in 2020 ordering the end to the genocide activities against the Rohingya. But the roughly 1 million ethnically cleansed Rohingya are living in tents and other temporary structures, including 880,000 in Kutupalong refugee camp in Bangladesh (Figure 7-59). Conditions in the camps continue to be dire, especially after the onset of the COVID-19 pandemic in 2020. Nearly 1 million Rohingya remain completely dependent on humanitarian aid, and malnutrition and other health conditions persist in what are the refugee settlements.

Pause & Reflect 7.4.1 Search online for information on the persecution of the Rohingya in Myanmar. Do descriptions of the recent forced migration of Rohingya people suggest to you that the Myanmar military has engaged in genocide? Explain.

FIGURE 7-58 DESTINATIONS OF ETHNICALLY CLEANSED ROHINGYA

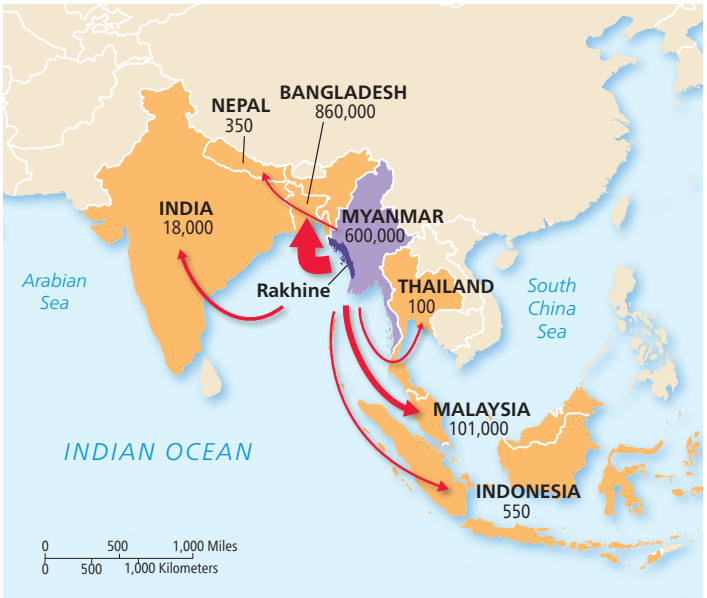


FIGURE 7-59 ROHINGYA REFUGEE CAMP Kutupalong refugee camp in Bangladesh.

Ethnic Cleansing & Genocide in Africa

Learning Outcome 7.4.2 Explain the variance between ethnicities and nationalities in Africa.

Competition among ethnicities can lead to ethnic cleansing and, in a handful of the most extreme cases, to genocide. Several areas of Africa have been plagued by conflicts among ethnicities that have resulted in genocide in recent years. Other countries of Africa have been either unable or unwilling to stop the genocide.

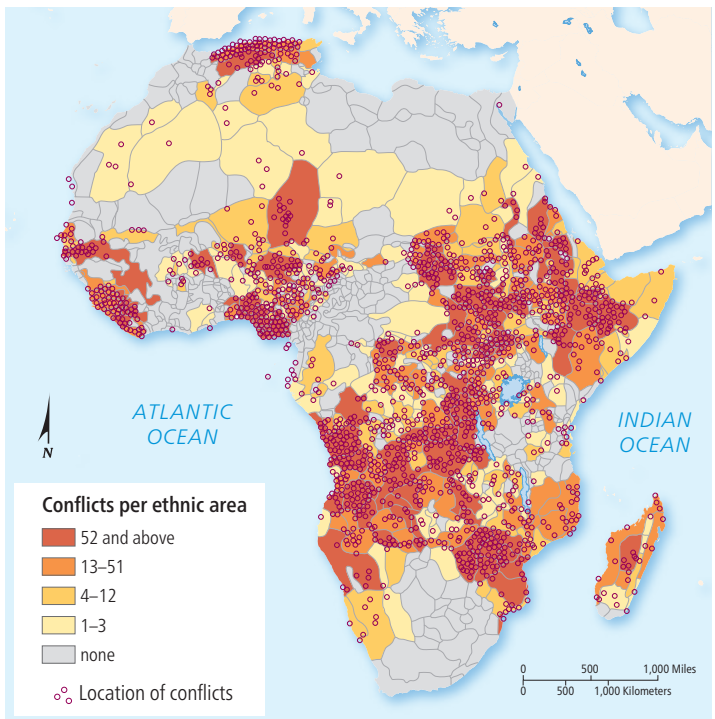
▲ **FIGURE 7-60 ONE OF AFRICA'S MANY ETHNICITIES AND NATIONALITIES** The Gurage people of Ethiopia.

Ethnicities & Nationalities in Africa

Traditionally, the most important element of cultural identity in Africa has been ethnicity rather than nationality. Africa contains several thousand ethnicities with distinct languages, religions, and social customs (Figure 7-60). The precise number of ethnicities is impossible to determine because boundaries separating them can be hard to define. Further, it is hard to determine whether a particular group forms a distinct ethnicity or is part of a larger collection of similar groups.

During the late nineteenth and early twentieth centuries, European countries carved up the continent of Africa into a collection of colonies, with little regard for the distribution of the thousands of ethnicities. When the European colonies in Africa became independent states, especially during the 1950s and 1960s, the areas of the new states typically matched the colonial administrative units imposed by the Europeans rather than the historical distribution of ethnicities (Figure 7-61). As a result, most states contained a large collection of often dissimilar ethnicities, and some ethnic groups were divided among more than one state. Conflict among ethnicities is widespread in Africa, largely because the historical distribution of ethnicities bears little relationship to present-day nationalities (Figure 7-62).

▲ **FIGURE 7-61 AFRICA'S MANY ETHNICITIES AND NATIONALITIES** The ethnic groups shown in dark brown have been divided among more than one country.



▲ **FIGURE 7-62 LOCATIONS OF ETHNIC CONFLICT IN AFRICA**

Ethnic Cleansing & Genocide in Rwanda & Burundi

Rwanda and Burundi, small countries in central Africa, have suffered long-standing conflicts between the two countries' two ethnic groups, the Hutus and Tutsis. The two ethnicities speak the same language, hold similar beliefs, and practice similar social customs, and intermarriage has lessened the physical differences between the two ethnic groups. Yet Hutus and Tutsis have engaged in large-scale ethnic cleansing and genocide.

Hutus were settled farmers, growing crops in the fertile hills and valleys of present-day Rwanda and Burundi, known as the Great Lakes region of central Africa. Tutsis were cattle herders who migrated to Rwanda and Burundi from the Rift Valley of western Kenya beginning 400 years ago. Relations between settled farmers and herders are often uneasy.

Hutus constituted a majority of the population of Rwanda and Burundi historically, but Tutsis controlled kingdoms there for several hundred years and turned the Hutus into their serfs. Rwanda and Burundi became colonies of Germany during the 1880s and then of Belgium between 1924 and 1962. During the colonial period, the Tutsis retained leadership positions in the region.

When Rwanda became an independent country in 1962, Hutus gained power and undertook ethnic cleansing and genocide against the Tutsis. Descendants of the ethnically cleansed Tutsis invaded Rwanda in 1990, launching a three-year civil war. Meanwhile in Burundi, where the Tutsis remained in power, a civil war resulted in genocide committed by and against both Hutus and Tutsis.

An agreement to share power in Rwanda was signed in 1993, but genocide resumed after an airplane carrying the presidents of Rwanda and neighboring Burundi – both Hutus – was shot down by a surface-to-air missile in 1994.

Hutus launched a genocide campaign, killing an estimated 800,000 Tutsis in Rwanda and 300,000 in Burundi (Figure 7-63). Rwanda continues to be governed by Tutsis, but Burundi has been led since 2005 by democratically elected Hutus.

Ethnic Cleansing & Genocide in the Congo

The Democratic Republic of Congo (DRC) is the region's largest and most populous country, with considerable mineral wealth. It is also one of the most ethnically diverse countries (Figure 7-64).

More than 5 million have died in the DRC's ongoing civil wars, mostly from malaria, diarrhea, pneumonia, and malnutrition, aggravated by displacement and unsanitary and overcrowded living conditions. Tutsis were instrumental in the successful overthrow of the DRC's longtime president Joseph Mobutu in 1997. Mobutu had amassed a several-billion-dollar personal fortune from the sale of minerals while impoverishing much of the country. After succeeding Mobutu as president, Laurent Kabila relied heavily on Tutsis and permitted them to kill some of the Hutus who had been responsible for atrocities against Tutsis in the early 1990s. But Kabila soon split with the Tutsis, and the Tutsis once again found themselves offering support to rebels seeking to overthrow the DRC's government.

Kabila turned for support to Hutus and other ethnic groups that also hated Tutsis. Armies from Angola, Namibia, Zimbabwe, and other neighboring countries came to Kabila's aid. Kabila was assassinated in 2001 and succeeded by his son, who negotiated an accord with rebels the following year. Despite the accord, conflict among the country's many ethnicities has continued, and casualties have mounted.

▲ **FIGURE 7-63 ETHNIC CLEANSING, RWANDA** Rwandan President Paul Kagam and his wife Jeannette Kagame light the flame of remembrance at the Kigali Genocide Memorial in Kigali, Rwanda.

Pause & Reflect 7.4.2 Why might the European colonial powers have preferred to place members of minority ethnicities in leadership positions?

▲ **FIGURE 7-64 ETHNICITIES IN THE DEMOCRATIC REPUBLIC OF CONGO** The distribution of the very large number of ethnicities in the Congo is not easy to represent on a map.

Conflict in Northeastern Africa

Learning Outcome 7.4.3 Discuss several episodes of ethnic cleansing and genocide in northeastern Africa.

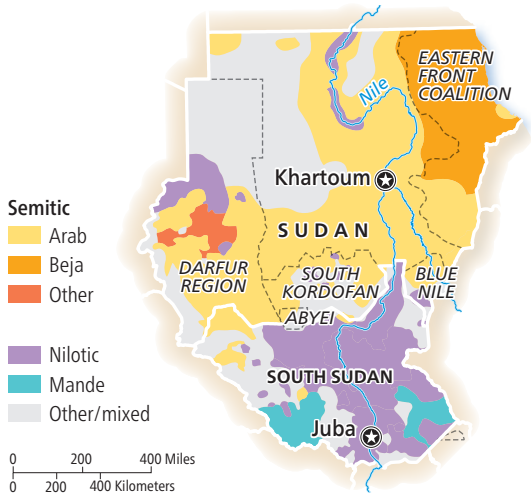
Ethnic cleansing and genocide have occurred in recent years in several countries in northeastern Africa.

Ethnic Cleansing & Genocide in Sudan

Several civil wars have raged in Sudan since 1983, resulting in genocide and ethnic cleansing. Sudan's two conflicts that have generated the most victims are with Darfur and South Sudan (Figure 7-65). Ethnic diversity lies at the heart of Sudan's conflicts. Sudan is around 70 percent Arab. The remainder belong to a large number of other ethnicities descended from groups living in Sudan prior to the arrival of Arabs in the twelfth century. The non-Arab ethnicities tend to live in the west, south, and east of Sudan.

South Sudan. A war from 1983 until 2005 between Sudan's northern and southern ethnicities resulted in the death of an estimated 2 million Sudanese and the ethnic cleansing of an estimated 700,000 (Figure 7-66). The war ended with the establishment of South Sudan as an independent state in 2011. In contrast to the predominantly Arab Muslim northerners, South Sudan's two largest ethnicities are the predominantly Christian Dinka and the predominantly folk religionist Nuer. The north–south war was sparked by southern ethnicities attempting to resist northerners' attempts to impose a legal system based on Muslim religious practice. Independence from Arab Muslim northerners has not brought peace to southerners, however. South Sudan's diverse ethnicities have not been able to work together to create a stable government.

Abyei. With the independence of South Sudan in 2011, conflict moved to the areas of Sudan along the new international border with South Sudan. Ethnicities aligned with those in the new country of South Sudan fought with supporters of the government of Sudan. The status of Abyei, a small border area inhabited by ethnicities aligned with both Sudan and South Sudan, was to be settled by a referendum of the people living there, but the vote was postponed. Until their status is settled, the people of Abyei are considered citizens of both Sudan and South Sudan. A peacekeeping force from Ethiopia is preventing either Sudan or South Sudan from seizing control of Abyei.



▲ **FIGURE 7-65 ETHNIC DIVERSITY IN SUDAN AND SOUTH SUDAN**

Darfur. Resenting discrimination and neglect by the Arab-dominated national government, Darfur's Black African ethnicities launched a rebellion in 2003. Marauding Arab nomads, known as Janjaweed, with the support of Sudan's government, crushed Darfur's mostly Christian Black population, made up mainly of settled farmers. An estimated 300,000 people in Darfur have been victims of genocide and another 3 million victims of ethnic cleansing. A peace treaty ending the rebellion was signed in 2020.

South Kordofan and Blue Nile. The two border areas of Sudan – South Kordofan and Blue Nile – also contain large numbers of ethnicities sympathetic to both Sudan and South Sudan. As in Abyei, a referendum intended to decide whether to place these territories in Sudan or South Sudan was canceled, leaving the future status unsettled.

Eastern Front. Ethnicities in the east have fought Sudanese government forces, with the support of neighboring Eritrea. At issue has been disbursement of profits from oil.

▼ **FIGURE 7-66 CAMP FOR SUDANESE REFUGEES** Refugees from Sudan, South Sudan, Ethiopia, and other nearby countries are living in Kakuma Refugee Camp, in Kenya, near the border with South Sudan.

Ethnic Cleansing & Genocide in Ethiopia

The Horn of Africa, which includes the countries of Ethiopia, Eritrea, and Somalia, is a region that has experienced multiple wars among ethnicities that have resulted in ethnic cleansing and genocide. The two most numerous ethnicities in Ethiopia are the Oromo and the Amhara. The Oromo, who are Muslim fundamentalists from the south, are the largest ethnicity in Ethiopia, at 34 percent of the population. However, for most of the twentieth century, Ethiopia was controlled by the Amhara, who are Christians. The Amhara, who comprise 27 percent of the population, had banned the use of languages other than Amharic, including Oromo (Figure 7-67).

Unlike most other parts of Africa, Ethiopia was an independent country for more than 2,000 years. Ethiopia was captured by Italy during the 1930s but regained its independence after Italy's defeat during World War II. Eritrea, located immediately to the north of Ethiopia, became a colony of Italy in 1890. When Italy was defeated in World War II, the United Nations awarded Eritrea to Ethiopia.

The U.N. expected Ethiopia to permit Eritrea considerable authority to run its own affairs, but Ethiopia dissolved the Eritrean legislature and banned the use of Tigrinya, Eritrea's major language. The Eritreans rebelled, beginning a 30-year fight for independence (1961–1991). During this civil war, an estimated 665,000 Eritrean refugees fled to neighboring Sudan. Eritrean rebels defeated the Ethiopian army in 1991, and 2 years later Eritrea became an independent state.

In 1991, a coalition of several ethnic groups overthrew the Amhara and took control of the government. The country adopted a policy of ethnic federalism, with most local government authority turned over to various ethnic groups. Some ethnicities used the additional powers to forcibly expel from their areas of control the other ethnicities.

In 2020, a civil war started between the federal government and the Tigray, the most numerous ethnicity in the northern portion of the country, along the border with Eritrea. Several hundred thousand Tigrayans have been killed or subject to ethnic cleansing, and several hundred thousand other Tigrayans are unable to obtain food (Figure 7-68).

▲ **FIGURE 7-67 ETHNIC DIVERSITY IN ETHIOPIA**

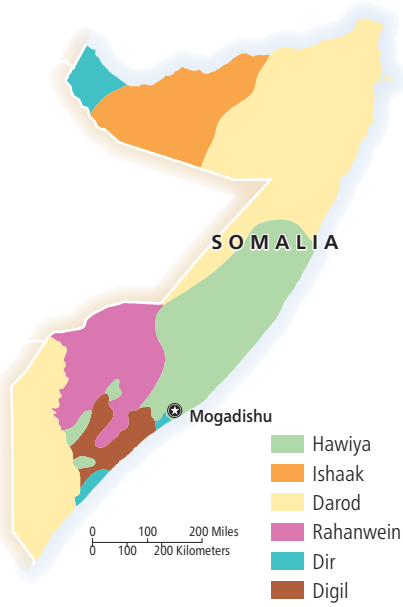
▲ **FIGURE 7-68 ETHIOPIAN SOLDIERS MARK THE ANNIVERSARY OF THE TIGRAY WAR**

Civil War in Somalia

On the surface, Somalia should face fewer ethnic divisions than its neighbors in the Horn of Africa. Somalis are overwhelmingly Sunni Muslims and speak Somali. Most share a sense that Somalia is a nation-state, with a national history and culture.

Somalia's 16 million inhabitants are divided among several ethnic groups known as clans, each of which is divided into a large number of subclans (Figure 7-69). Traditionally, the major clans occupied different portions of Somalia. In 1991, a dictatorship that ran the country collapsed, and various clans and subclans claimed control over portions of the country. Clans have declared independent states of Somaliland in the north, Puntland in the northeast, Galmudug in the center, and Southwestern Somalia in the south.

A civil war has raged in Somalia since 1991 among the various clans and subclans. The United States has provided support for the Somali government, primarily in the form of drone and airstrikes aimed at al-Shabaab, considered a terrorist group by the United States. Around 500,000 Somalis have been killed during the war.



▲ **FIGURE 7-69 ETHNIC DIVERSITY IN SOMALIA**

Ethnic Cleansing & Genocide in Europe

Learning Outcome 7.4.4 Describe the breakup of Yugoslavia and its consequences for Balkan ethnic groups.

In Europe, the largest number of people impacted by ethnic cleansing and genocide occurred before, during, and immediately after the two world wars of the twentieth century: World War I (1914–1918) and World War II (1939–1945). In the twenty-first century, Russia's war in Ukraine has produced the largest number of refugees.

Ethnic Cleansing & Genocide in Europe During World War II

During World War II, the Nazis deported and then exterminated around 17 million people; 6 million were Jews, including 1 million children. One-third of the world's Jewish population and two-thirds of Europe's Jewish population died. After World War II ended, millions of ethnic Germans, Poles, Russians, and other groups were forced to migrate as a result of boundary changes (Figure 7-70).

▲ **FIGURE 7-70 FORCED MIGRATION OF ETHNICITIES AFTER WORLD WAR II** The largest number were Poles forced to move from territory occupied by the Soviet Union (now Russia), Germans forced to migrate from territory taken over by Poland and the Soviet Union, and Russians forced to return to the Soviet Union from Western Europe.

The Balkans

The Balkans, about the size of Texas, is a region named for the Balkan Mountains (known in Slavic languages as Stara Planina), which extend east–west across the region. The region includes Albania, Bulgaria, Greece, and Romania as well as several countries that once comprised Yugoslavia. A complex assemblage of ethnicities has long made the Balkans a hotbed of unrest (Figure 7-71). Most profoundly for the rest of the world, the incident that sparked World War I occurred in the Balkans. In June 1914, the heir to the throne of Austria-Hungary was assassinated in Sarajevo by a Serb who sought independence for Bosnia.

After World War I, the Allies created a new country, Yugoslavia, to unite several Balkan ethnicities that spoke similar South Slavic languages. The prefix *Yugo* in the country's name derived from the Slavic word for "south." Longtime leader Josip Broz Tito (prime minister 1943–1963 and president 1953–1980) was instrumental in forging a Yugoslav nationality. Central to Tito's vision of a Yugoslav nationality was acceptance of ethnic diversity in language and religion. Individuals from the five most numerous ethnicities – Croat, Macedonian, Montenegrin, Serb, and Slovene – were allowed to exercise considerable control over the areas they inhabited within Yugoslavia.

▲ **FIGURE 7-71 THE BALKANS IN 1914**

Multiethnic Yugoslavia

Pause & Reflect 7.4.2 What is another example of a country that is inhabited primarily by ethnic Slavs?

After the death of President Tito in 1980, rivalries among ethnicities surfaced in Yugoslavia, leading ultimately to its breakup into several small countries in 1992 (Figure 7-72). Because the boundaries of the new countries did not match the distribution of ethnicities, the breakup of Yugoslavia did not happen peacefully. Several episodes of ethnic cleansing ensued.

Ethnic Cleansing in Kosovo

At the time of the breakup of Yugoslavia, 82 percent of the population of Kosovo were ethnic Albanians and 10 percent were Serbs. Nonetheless, Kosovo was controlled by Serbia. Serbia had a historical claim to Kosovo, having controlled it between the twelfth and fourteenth centuries. Serbs fought an important – though losing – battle in Kosovo against the Ottoman Empire in 1389. In recognition of its role in forming the Serb ethnicity, Serbia was given control of Kosovo when Yugoslavia was created in the early twentieth century.

With the breakup of Yugoslavia, Serbia took direct control of Kosovo and launched a campaign of ethnic cleansing of the Albanian majority. At its peak in 1999, Serb ethnic cleansing forced more than 800,000 of Kosovo's 2 million ethnic Albanian residents from their homes.

Kosovo declared its independence from Serbia in 2008. Around 99 countries, including the United States, recognize Kosovo as an independent country, but Serbia, Russia, China, and their allies oppose it. However, the declaration of Kosovo's independence induced nearly 90 percent of the country's Serbs to leave.

Steps in Ethnic Cleansing

Ethnic cleansing often follows four steps.

- **Step 1:** Move a large amount of military equipment and personnel into a village that has no strategic value.
- **Step 2:** Round up all the people in the village. Segregate men from women, children, and old people. Place men in detention camps or kill them.
- **Step 3:** Force the rest of the people to leave the village.
- **Step 4:** Destroy the vacated village.

A series of photographs taken by NATO air reconnaissance over the village of Glodane, in western Kosovo, illustrates the four steps in ethnic cleansing. Figure 7-73 is one of those reconnaissance photos. An aerial photograph like this not only "proved" that ethnic cleansing was occurring but also provided critical evidence to prosecute Serb leaders for war crimes.

▲ **FIGURE 7-72 BREAKUP OF YUGOSLAVIA** Until its breakup in 1992, the country of Yugoslavia consisted of six republics—Bosnia & Herzegovina, Croatia, Macedonia, Montenegro, Serbia, and Slovenia. These republics exercised considerable control over their local affairs. Kosovo and Vojvodina were considered autonomous regions within Serbia.

▶ **FIGURE 7-73 EVIDENCE OF ETHNIC CLEANSING, GLODANE, KOSOVO** Ethnic cleansing by Serbs forced Albanians living in Kosovo to flee in 1999.
Step 1: The red circles show the location of Serb armored vehicles along the main street of the village. The village's houses and farm buildings are clustered on the left side, with fields on the outskirts.
Step 2: The farm field immediately to the east of the main north–south road is filled with the villagers. The people appear as a dark mass inside the blue lines labeled "Internally Displaced Persons." The white rectangles to the north of the people are civilian cars and trucks.
Step 3 (not pictured): At the same location a short time later, the people and vehicles massed in the field in this photograph are gone—no people and no vehicles can be found.
Step 4 (not pictured): The village had been set on fire.

Ethnic Cleansing in Bosnia & Herzegovina

Learning Outcome 7.4.5 Explain the concept of ethnic cleansing in Bosnia & Herzegovina.

The largest scale of ethnic cleansing in the former Yugoslavia occurred in Bosnia & Herzegovina. An estimated 2.7 million people were ethnically cleansed in 1991–1992.

Ethnic Diversity in Bosnia & Herzegovina

Bosnia & Herzegovina was the most ethnically diverse republic of the former Yugoslavia. At the time of the breakup of Yugoslavia, the population of Bosnia & Herzegovina was 44 percent Bosniaks, 31 percent Serbs, and 17 percent Croats (Figure 7-74a). Bosniaks are frequently called Bosnian Muslims, in recognition of their predominant religion. Rather than live in an independent multiethnic state with a Muslim plurality, Bosnia & Herzegovina's Serbs and Croats fought to unite the portions of the republic that they inhabited with Serbia and Croatia, respectively.

To strengthen their cases for breaking away from Bosnia & Herzegovina, Serbs and Croats engaged in ethnic cleansing of Bosniaks (Figure 7-75). According to the United Nations, ethnic cleansing in Bosnia included "murder, torture, arbitrary arrest and detention, extra-judicial executions, rape and sexual assaults, confinement of civilian population in ghetto areas, forcible removal, displacement and deportation of civilian population, deliberate military attacks or threats of attacks on civilians and civilian areas, and wanton destruction of property."

Ethnic cleansing ensured that areas did not merely have majorities of Bosnian Serbs and Bosnian Croats but were ethnically homogeneous and therefore better candidates for union with Serbia and Croatia. Ethnic cleansing by Serbs against Bosniaks was especially severe because the territory inhabited by Serbs in Bosnia comprised several discontinuous areas, many of which were separated from Serbia by areas with Bosniak majorities. By ethnically cleansing Bosniaks from intervening areas, Bosnian Serbs created one continuous area of Serb domination rather than several discontinuous ones (Figure 7-74b).

FIGURE 7-74 BOSNIA & HERZEGOVINA BEFORE AND AFTER ETHNIC CLEANSING (a) Distribution of ethnicities in Bosnia & Herzegovina before the war during the 1990s. (b) Distribution of ethnicities after ethnic cleansing, which resulted in a transfer of control of territory from Bosniaks to Serbs and Croats.

(a) (b)

FIGURE 7-75 SREBRENICA MASSACRE The 1995 Srebrenica massacre is considered the largest single ethnic cleansing and genocide event in Bosnia & Herzegovina. In this image, Bosniaks, who had been ethnically cleansed from the village of Srebrenica by Serbs, arrive at a refugee camp after walking for several days. Figure 7-74 shows that following ethnic cleansing, Srebrenica changed from predominantly Bosniak to predominantly Serb.

Bosnia & Herzegovina After Ethnic Cleansing

Accords reached in Dayton, Ohio, in 1996 by leaders of the various ethnicities divided Bosnia & Herzegovina into three regions, one each dominated, respectively, by Bosniaks, Croats, and Serbs. The Bosniak and Croat regions were combined into a federation, with some cooperation between the two groups, but the Serb region has operated with almost complete independence in all but name from the others.

The International Criminal Tribunal for the former Yugoslavia, established by the United Nations, convicted Croat and Serb leaders of war crimes for the ethnic cleansing of Bosniaks. Yet ethnic cleansing was ultimately successful. The Dayton agreements gave Serbs control of around 50 percent of the land even though they comprised only 40 percent of the population of Bosnia & Herzegovina. Croats got around 20 percent of the land but comprised only 15 percent of the population. Bosniaks, with 45 percent of the population, got only 30 percent of the land (refer to Figure 7-74). Nonetheless, Bosnia & Herzegovina is once again a relatively peaceful place (Figure 7-76).

Pause & Reflect 7.4.5 In which regions within Bosnia & Herzegovina did Serbs gain most of their territory?

Balkanization

The terms *Balkanized* and *Balkanization* were once widely used by world leaders as well as geographers:

- *Balkanized* was defined as a small geographic area that could not successfully be organized into stable countries because it was inhabited by many ethnicities with complex, long-standing antagonisms toward each other.
- *Balkanization* was defined as the process by which a state breaks down through conflicts among its ethnicities.

A century ago, world leaders regarded the process of Balkanization of Southeast Europe as a threat to world peace. They were right: Balkanization led directly to World War I because the various nationalities in the Balkans dragged into the war the larger powers with which they had alliances.

After two world wars and the rise and fall of communism during the twentieth century, Southeast Europe once again became Balkanized into the twenty-first century. Peace has come to the Balkans in the twenty-first century because ethnic cleansing tragically accomplished its goal. Thousands of people were rounded up and killed or forced to migrate because they constituted ethnic minorities. Ethnic homogeneity has become the price of peace in areas that once were multiethnic.

▲ **FIGURE 7-76 A SYMBOL OF ETHNIC CLEANSING IN BOSNIA & HERZEGOVINA** (a) The Stari Most (old bridge), in the city of Mostar, Bosnia & Herzegovina, was built by the Turks in 1566 across the Neretva River. (b) The bridge was blown up by Croats in 1993 as part of their ethnic cleansing against the Bosniaks. (c) With the end of the war in Bosnia & Herzegovina, the bridge was rebuilt in 2004.

7 Summary & Review

KEY ISSUE

7.1 | Where Are Ethnicities Distributed?

- Ethnicity, race, and nationality are frequently confused.
- The U.S. census classifies Americans according to race, including White, Black or African American, and Asian. Americans are also classified according to whether or not they identify as having Hispanic, Latino, or Spanish origin.
- The three most numerous U.S. groups have distinctive distributions at regional, state, and urban scales.

KEY ISSUE

7.2 | Why Do Ethnicities Have Distinctive Distributions?

- Ancestors of some Black Americans were forcibly transported to the U.S. south and enslaved there.
- Many Black Americans migrated from the South during the early twentieth century.
- Segregation of races was legal in the United States and South Africa for much of the twentieth century.

KEY ISSUE

7.3 | Why Do Ethnicities & Nationalities Differ?

- Nationality is identity with a group of people who share legal attachment and personal allegiance to a particular country.
- Lack of correspondence between ethnicities and nationalities is especially severe in western areas of Asia.
- Some ethnicities, such as the Kurds, are divided among more than one nationality.

KEY ISSUE

7.4 | Why Do Ethnic Cleansing & Genocide Occur?

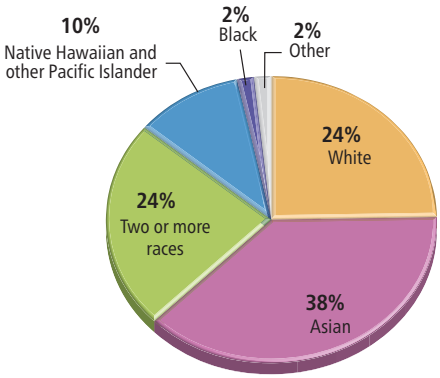
- Ethnic cleansing is a process in which a more powerful ethnic group forcibly removes a less powerful one in order to create an ethnically homogeneous region.
- Genocide is the mass killing of a group of people in an attempt to eliminate the entire group from existence.

Thinking Geographically

KEY ISSUE

7.1 | Where Are Ethnicities Distributed?

Hawaii demonstrates a racial and ethnic diversity distinct from the other 49 states. What geographic factors contribute to Hawaii's distinctive ethnic and racial distribution?



▲ **FIGURE 7CR-1 DISTRIBUTION OF ETHNICITIES IN HAWAII**

KEY ISSUE

7.2 | Why Do Ethnicities Have Distinctive Distributions?

Since the repeal of apartheid laws, races in South Africa continue to be highly segregated. Why might separation persist despite the end of legal segregation?

▲ **FIGURE 7CR-2 BLACK TOWNSHIP, SOUTH AFRICA**

KEY ISSUE

7.3 | Why Do Ethnicities & Nationalities Differ?

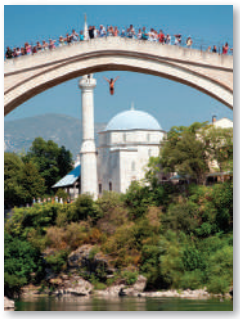
The Kurds claim to be the world's largest ethnic group not in control of a country. Based on Figures 7-46 and 7-49, what other ethnic groups might have a strong claim to reorganize territorial boundaries so that they could become the majority? What are some of the obstacles that might be faced in sharing power with other ethnicities?

▲ **FIGURE 7CR-3 KURDS CELEBRATE NEWROZ FESTIVAL**

KEY ISSUE

7.4 | Why Do Ethnic Cleansing & Genocide Occur?

Professional divers hold competitions to dive off the Stari Most bridge in Mostar. Why might the bridge be an important place to hold professional diving competitions? The United Nations Educational, Scientific and Cultural Organization (UNESCO) has placed the bridge on its list of World Heritage sites. Why would the bridge be considered a World Heritage site? Consult unesco.org and search for World Heritage site #946.



▲ **FIGURE 7CR-4 STARI MOST BRIDGE DIVE, MOSTAR**

Key Terms

Apartheid Laws (no longer in effect) in South Africa that physically separated different races into different geographic areas.

Black Lives Matter (BLM) Movement that campaigns against violence and perceived racism toward Black people and educates others about the challenges that Black Americans continue to face in the United States.

Blockbusting A process by which real estate agents convince white property owners to sell their houses at low prices because of fear that Black people will soon move into the neighborhood.

Census A complete enumeration of a population.

Ethnic cleansing A purposeful policy designed by one ethnic or religious group to remove by violent and terror-inspiring means the civilian population of another ethnic or religious group from certain geographic areas.

Ethnicity Identity with a group of people who share the cultural traditions of a particular homeland or hearth.

Ethnophobia Fear of people of a particular ethnicity.

Genocide The mass killing of a group of people in an attempt to eliminate the entire group from existence.

Nationalism Loyalty and devotion to a particular nationality.

Nationality Identity with a group of people who share legal attachment to a particular country.

Race Identity with a group of people who are perceived to share a physiological trait, such as skin color.

Racism The belief that race is the primary determinant of human traits and capacities and that racial differences produce an inherent superiority of a particular race.

Racist A person who subscribes to the beliefs of racism.

Redlining A process by which financial institutions draw red-colored lines on a map and refuse to lend money for people to purchase or improve property within the lines.

Sharecropper A person who works fields rented from a landowner and pays the rent and repays the loans by turning over to the landowner a share of the crops.

Triangular slave trade A practice, primarily during the eighteenth century, in which ships left Europe for Africa with cloth and other goods used to buy people. The same ships transported these enslaved people across the Atlantic. Completing the triangle, the ships returned to Europe with sugar and molasses.

Xenophobia Fear of people who are from other countries.

International Geographic Mapping Explorations

Legacy of Apartheid in South Africa

Although apartheid has ended in South Africa, most Black South Africans and White South Africans lead very different lives. Townships inhabited primarily by Blacks have more modest housing and shops than do communities inhabited primarily by Whites.

FIGURE 7CR-5 LAWLEY TOWNSHIP, SOUTH AFRICA

. . . . Geographers understand that ethnic identity can be deeply rooted in a sense of place. Ethnic groups may aspire to govern a portion of Earth's surface of meaning to them, but political conditions do not always make this possible, as we see in the next chapter, Political Geography. . . .

8 Political Geography

KEY ISSUES

8.1 Where Are States Distributed?

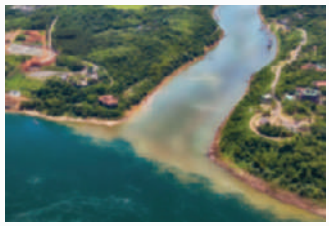
Earth's land area is divided into states, all but a handful of which are members of the United Nations.

8.2 Why Are States Challenging to Create?

The organization of Earth's surface into a collection of sovereign states is recent. Many states have been created to match the territory occupied by cultural groups, though this has not always been possible.

8.3 Why Do States Have Distinctive Geographic Structure?

Boundaries divide Earth's surface into a collection of states that assume various shapes. Legislative boundaries within states are sometimes gerrymandered.



8.4 Why Do States Face Threats?

The number of democracies has increased in the twenty-first century, but democracies face increasing challenges from autocratic states, nuclear power, and terrorist organizations.

▶ Voting in Diepsloot, South Africa.

How many states of the world can you name? Can you find them on a map? Old-style geography sometimes required memorization of countries and their capitals. Human geographers now emphasize a thematic approach that studies the locations of activities in the world, the reasons for particular spatial distributions, and the significance of the arrangements. Despite this change in emphasis, you still need to know the locations of states. Without such knowledge, you lack a basic frame of reference—knowing where things are.

LOCATIONS EXPLORED IN THIS CHAPTER

KEY ISSUE

8.1 | Where Are States Distributed?

When looking at satellite images of Earth, we easily distinguish landmasses and water bodies. What we cannot see are where boundaries are located between countries. One of Earth's most fundamental cultural characteristics—one that we take for granted—is the division of our planet's surface into a collection of spaces occupied by individual countries. To many, national boundaries are more meaningful than natural features.

Politics & Geography

Learning Outcome 8.1.1 Explain the difference between a state of the world and a state within the United States.

A **state** is an area organized into a political unit and ruled by an established government that has control over its internal and foreign affairs. It occupies a defined territory on Earth's surface and contains a permanent population. *Country* is a synonym for *state*. The term *state*, as used in political geography, does not refer to the 50 regional governments inside the United States. The 50 states of the United States are subdivisions within a single state – the United States of America.

A map of the world shows that virtually all habitable land is organized into states. But for most of history, until recently, this was not so. As recently as the 1940s, the world contained only about 50 countries, compared to approximately 200 today (Figure 8-1).

The land area occupied by the states of the world varies considerably. The largest state is Russia, which encompasses 17.1 million square kilometers (6.6 million square miles), or 11 percent of the world's entire land area. Other states with more than 5 million square kilometers (2 million square miles) include Canada, the United States, China, Brazil, and Australia. The six largest states together encompass 40 percent of the world's land area.

At the other extreme are about two dozen **microstates**, which are states with very small land areas. If Russia were the size of a printed page or notebook computer screen, a microstate would be the size of a single letter on it. The Vatican is the world's smallest microstate at 0.49 square kilometers (0.19 square miles). The second-smallest microstate and the smallest that is a member of the United Nations is Monaco (Figure 8-2), which is only 2 square kilometers (0.8 square miles). Nauru is the world's smallest island state, at 21 square kilometers (8.1 square miles).

Other U.N. member states that are smaller than 1,000 square kilometers (400 square miles) include Andorra, Antigua & Barbuda, Bahrain, Barbados, Dominica, Grenada, Kiribati, Liechtenstein, Maldives, Malta, Marshall Islands, Micronesia, Palau, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, San Marino, São Tomé e Príncipe, Seychelles, Singapore, Tonga, and Tuvalu. Many of the microstates are islands, which explains both their small size and sovereignty.

▲ **FIGURE 8-1 STATES OF THE WORLD** All but a handful of states are members of the United Nations.

Pause & Reflect 8.1.1 With virtually all of Earth's land now allocated to states, how might the number of states increase in the future?

▼ **FIGURE 8-2 A MICROSTATE** Monaco occupies only 2 square kilometers (0.8 square miles). Nearly all of Monaco is visible here. France is in the background.

A World of States

Learning Outcome 8.1.2 Explain the growth in the number of states in the world.

A state has **sovereignty**, which means independence from control of its internal affairs by other states. Because the entire area of a state is managed by its national government, laws, army, and leaders, it is a good example of a formal or uniform region.

The United Nations

The United Nations was organized in 1945 with 51 original members, including 49 sovereign states plus Byelorussia (now Belarus) and Ukraine, then part of the Soviet Union. The number of U.N. members reached 193 in 2011 (Figure 8-3). The U.N. membership has increased rapidly on three occasions:

- **1955.** Sixteen countries joined in 1955, mostly European countries that had been liberated from Nazi Germany during World War II.
- **1960.** Seventeen new members were added in 1960, all but one a former African colony of Britain or France. Only four African states were original members of the United Nations – Egypt, Ethiopia, Liberia, and South Africa – and only six more joined during the 1950s.
- **1990–1993.** Twenty-six countries were added between 1990 and 1993, primarily due to the breakup of the Soviet Union and Yugoslavia. U.N. membership also increased in the 1990s because of the admission of several microstates.

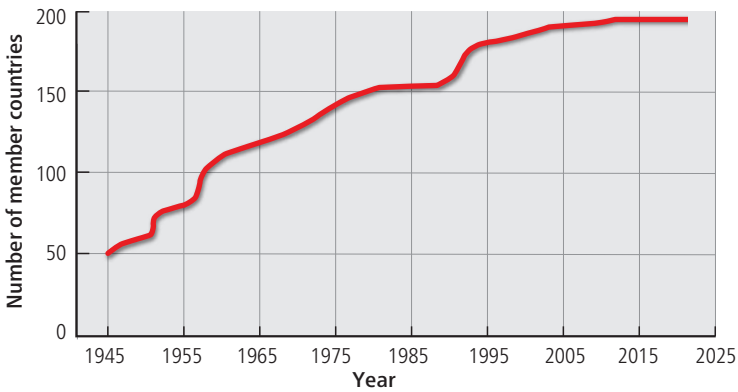
The United Nations was not the world's first attempt at international peacemaking. The U.N. replaced an earlier organization known as the League of Nations, which was established in 1920 after World War I (1914–1918). The League of Nations was never an effective peacekeeping organization. The United States did not join it, despite the fact that President Woodrow Wilson initiated the idea, because the U.S. Senate refused to ratify the membership treaty. By the 1930s, Germany, Italy, Japan, and the Soviet Union had all withdrawn, and the League of Nations could not stop aggression by these states against neighboring countries.

On occasion, the U.N. has intervened in conflicts between or within member states, authorizing military and peacekeeping actions. U.N. members can vote to establish a peacekeeping force and request that states contribute military forces. The U.N. is playing an important role in trying to separate warring groups in a number of regions, especially in Southeast Europe, Central and Southwest Asia, and sub-Saharan Africa. Because it must rely on individual countries to supply troops, the U.N. often lacks enough military forces to keep peace effectively. The U.N. tries to maintain strict neutrality in separating warring factions, but this has proved difficult in places such as South Sudan (Figure 8-4).

However, any one of the five permanent members of the U.N. Security Council – China, France, Russia (formerly the Soviet Union), the United Kingdom, and the United States – can veto a peacekeeping operation. Over the years, the United States and the Soviet Union have used the veto to prevent undesired U.N. intervention. The U.N. voted to send troops to support South Korea in 1950 only after the Soviet Union's delegate walked out of a Security Council meeting. More recently, the opposition of China and Russia has made it difficult for the international community to prevent Iran from developing nuclear weapons or to prevent Russia's invasion of Ukraine.

Despite its shortcomings, though, the U.N. represents a forum where, during this era of rapid changes in states and their relationships, for the first time in history virtually all states of the world can meet and vote on issues without resorting to war. More importantly, the U.N. has played a major role in the promotion of international cooperation to address global economic problems, promote human rights, and provide humanitarian relief.

Pause & Reflect 8.1.2 Why have only a small handful of states joined the U.N. since 2000?



▲ **FIGURE 8-3 GROWTH IN U.N. MEMBERSHIP** U.N. membership has increased from its original 51 to 193.

▲ **FIGURE 8-4 UNITED NATIONS PEACEKEEPERS FROM SRI LANKA PREPARING TO DEPART FOR SERVICE IN SOUTH SUDAN**

Unitary & Federal States

The internal governments of states are organized according to one of two approaches: unitary and federal. The size of the state is not always an accurate predictor of the form of government: Tiny Belgium is a federal state to accommodate the two main cultural groups, the Flemish and the Walloons (refer to Figure 5-37), whereas China (one of the world's largest states) is a unitary state.

Unitary State. In a **unitary state**, most power is placed in the hands of central government officials. In principle, a unitary government works best in a relatively compact nation-state characterized by few internal cultural differences and a strong sense of national unity. Unitary states are especially common in Europe. France, for example, has a long tradition of unitary government in which a very strong national government dominates local government decisions (Figure 8-5).

Federal State. Strong power is allocated to units of local government in a **federal state**. In principle, the federal system is more suitable for very large states because the national capital may be too remote to provide effective control over isolated regions. Most of the world's largest states are federal, including Russia, Canada, Brazil, India, and the United States (Figure 8-6). For example, the federal state principle is embedded in the Tenth Amendment to the United States Constitution, which reads: "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

In recent years, there has been a strong global trend toward federal government. Unitary systems have been sharply curtailed in a number of countries and scrapped altogether in others. In the face of increasing demands by ethnicities for more self-determination, states have restructured their governments to transfer some authority from the national government to local government units. An ethnicity that is not sufficiently numerous to gain control of the national government may be content with control of its territory through a regional or local unit of government.

FIGURE 8-5 UNITARY STATE Voting for President, Tours, France.

FIGURE 8-6 FEDERAL STATE Town Hall meeting, Calais, Vermont.

KEY ISSUE

8.2 | Why Are States Challenging to Create?

The concept of dividing the world into a collection of independent states is recent. Prior to the 1800s, Earth's surface was organized in other ways, such as into city-states, empires, kingdoms, and small land areas controlled by a hereditary class of nobles.

Evolution of States

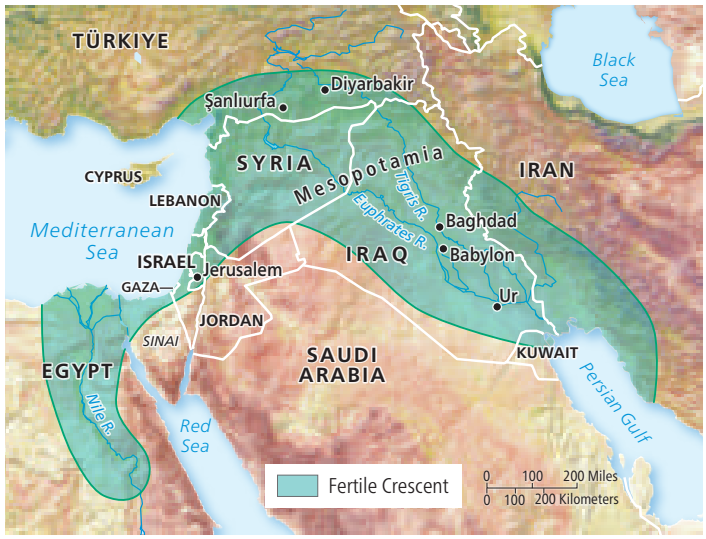
Learning Outcome 8.2.1 Summarize how states developed historically.

The first states emerged in ancient times in Southwest Asia & North Africa. Until modern times, much of Earth's land area remained unorganized territory.

Ancient States

The development of states in ancient times can be traced to a region of Southwest Asia known as the Fertile Crescent. The ancient Fertile Crescent formed an arc between the Persian Gulf and the Mediterranean Sea (Figure 8-7). Situated at the crossroads of Europe, Asia, and Africa, the Fertile Crescent was a center for land and sea communications in ancient times.

The eastern end of the crescent, Mesopotamia, was centered in the valley formed by the Tigris and Euphrates rivers, in present-day Iraq (Figure 8-8). The Fertile Crescent then curved westward over the desert and turned southward to encompass the Mediterranean coast through present-day Syria, Lebanon, and Israel. The Nile River valley of Egypt is sometimes regarded as an extension of the Fertile Crescent into North Africa.



▲ **FIGURE 8-7 FERTILE CRESCENT** The crescent-shaped area of relatively fertile land was organized into a succession of empires starting several thousand years ago.

The first states to evolve in Mesopotamia were known as city-states. A **city-state** is a sovereign state that comprises a town and the surrounding countryside. Singapore is an example of a present-day city-state. In ancient times, walls clearly delineated the boundaries of a city, and outside the walls, a city controlled agricultural land to produce food for urban residents. The countryside also provided a city with an outer line of defense against attack by other city-states.

Periodically, one city-state or tribe in Mesopotamia would gain military dominance over the others and form an empire. Mesopotamia was organized into a succession of empires by the Sumerians, Assyrians, Babylonians, and Persians.

Pause & Reflect 8.2.1 What is the importance of the Fertile Crescent in the development of religions, as discussed in Chapter 6? How might the development of ancient states and religions in the region be related?

▶ **FIGURE 8-8 FERTILE CRESCENT LANDSCAPE** Euphrates River, Şanlıurfa, Türkiye.

Roman Empire to Medieval States

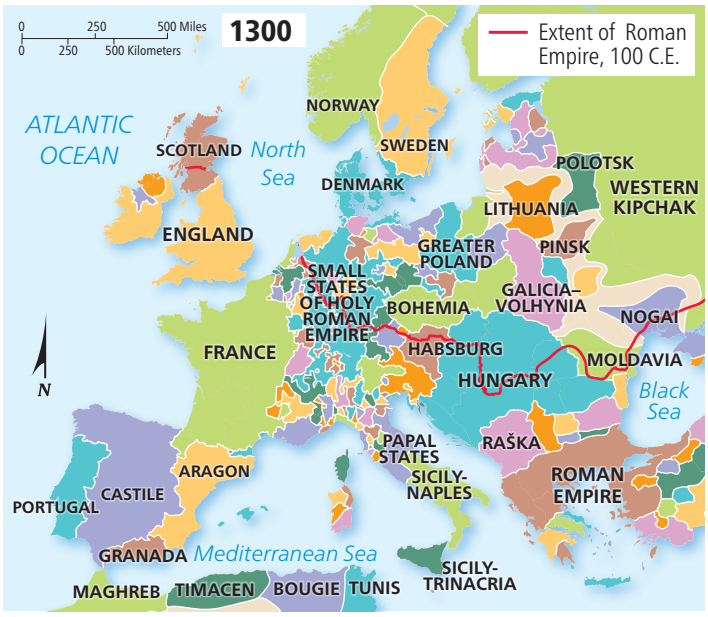
Political unity in the ancient world reached its height with the establishment of the Roman Empire, which controlled most of Europe, North Africa, and Southwest Asia, from modern-day Spain to Iran and from Egypt to England (Figure 8-9). At its maximum extent, in 117 C.E., the empire comprised 46 provinces, each using the same set of laws that had been created in Rome. Massive walls helped the Roman army defend many of the empire's frontiers (Figure 8-10).

The Roman Empire collapsed in the fifth century, after a series of attacks by people living on its frontiers and because of internal disputes. The European portion of the Roman Empire was fragmented into a large number of estates owned by competing kings, dukes, barons, and other nobles. Victorious nobles seized control of defeated rivals' estates, and after these nobles died, others fought to take possession of their land.

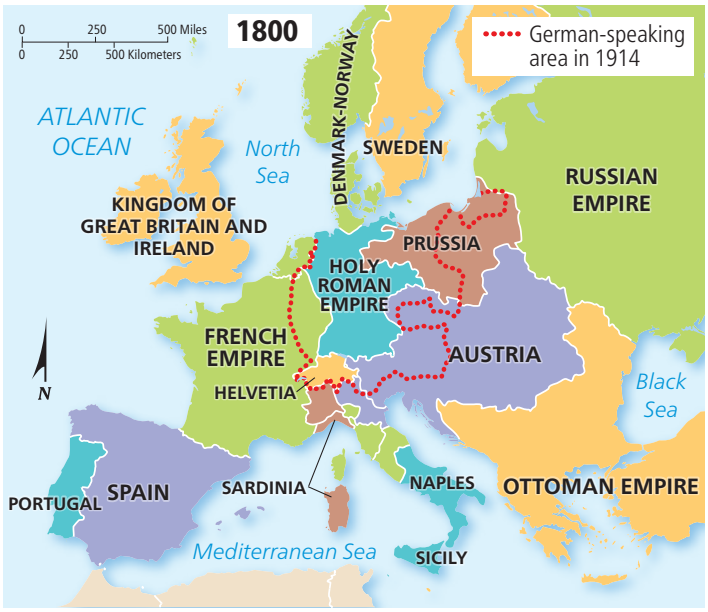
A handful of powerful kings emerged as rulers over large numbers of these European estates beginning around the year 1100 (Figure 8-11). The consolidation of neighboring estates under the unified control of a king formed the basis for the development of such modern European states as France and Spain (Figure 8-12).

▲ **FIGURE 8-9 ROMAN EMPIRE 100 C.E.** At its height, the Roman Empire controlled much of Europe as well as Southwest Asia & North Africa.

▼ **FIGURE 8-10 ROMAN EMPIRE WALL** Hadrian's Wall was constructed beginning in 122 B.C.E., during the reign of Roman Emperor Hadrian, to protect the Roman province of Britain from people living to the north, which was not part of the Roman Empire.



▲ **FIGURE 8-11 EUROPE, 1300** Much of Europe was fragmented into small estates controlled by nobles.



▲ **FIGURE 8-12 EUROPE, 1800** Much of Europe was organized into empires.

Nation-States

Learning Outcome 8.2.2 Describe the modern development of nation-states.

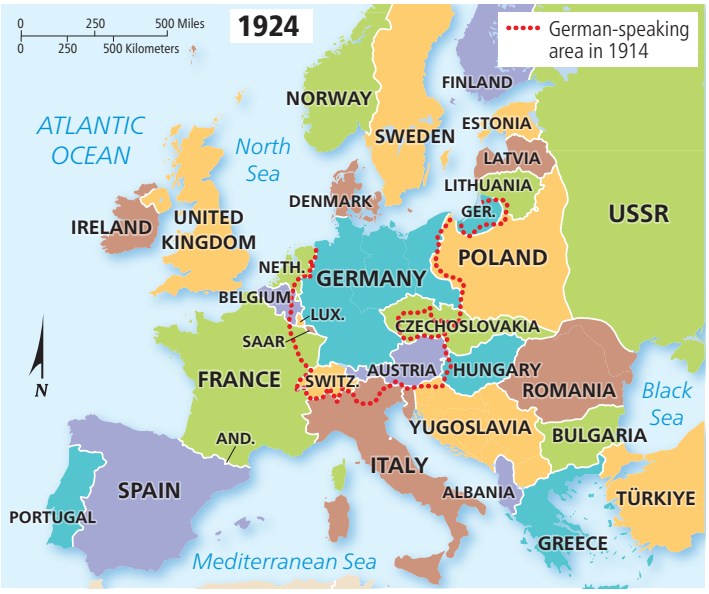
A state is an area organized into a political unit. A **nation** is a large group of people who are united by common cultural characteristics, such as language and ethnicity, or by shared history. A **nation-state** is a state whose territory corresponds to that occupied by a particular nation.

The concept that nations have the right to govern themselves is known as **self-determination**. To preserve and enhance distinctive cultural characteristics, nations seek to govern themselves without interference. Nations have pushed to create nation-states because desire for self-rule is a very important shared attitude for many of them.

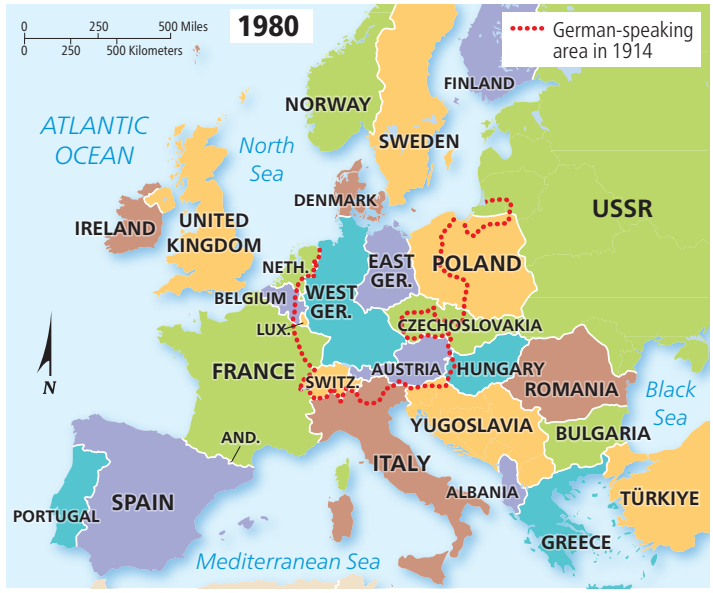
Nation-States in Europe

In modern times, the concept of nation-states developed first in Europe. After World War I, which engulfed nearly all of Europe, Allied leaders of the victorious countries met in 1919 at the Versailles Peace Conference to redraw the map of Europe. One of the chief advisers to U.S. President Woodrow Wilson, the geographer Isaiah Bowman, played a major role in the decisions.

The goal of the Allied leaders was to divide Europe into a collection of nation-states, using language as the principal criterion for identifying ethnic groups. New states were created and the boundaries of existing states were adjusted to conform as closely as possible to the territory occupied by speakers of different languages (Figure 8-13). This undertaking created some clear-cut examples of nation-states, but many of the states created a century ago in Europe have not survived as nation-states.



▲ **FIGURE 8-13 EUROPE, 1924** Much of Europe was organized into nation-states.



▲ **FIGURE 8-14 EUROPE, 1980** Germany was divided into two states after its defeat in World War II.

The attempt after World War I to divide Europe into nation-states was not a recipe for peace. During the 1930s, Germany's National Socialists (Nazis) claimed that all German-speaking parts of Europe constituted one nationality and should be unified into one state. After many years of appeasing the Nazis' expansion in Central Europe, the United Kingdom and France finally declared war in 1939 when the Nazis invaded Poland, clearly not a German-speaking state.

Following its defeat in World War II (1939–1945), Germany was divided into two states (Figure 8-14). Two Germanys – the German Democratic Republic (informally East Germany) and the Federal Republic of Germany (informally West Germany) – existed from 1949 until 1990. Checkpoints limited the ability to cross between the two Germanys (Figure 8-15). A massive forced migration of people in Europe after World War II relocated many ethnic groups into the newly demarcated territory of the region's various nation-states. With the end of communism in 1990, the German Democratic Republic ceased to exist, the physical barriers were dismantled, and its territory became part of the German Federal Republic. The present-day state of Germany bears little resemblance to the territory occupied by German-speaking people prior to the upheavals of the twentieth century.

▼ **FIGURE 8-15 CHECKPOINT CHARLIE** When Germany was divided into two states, Checkpoint Charlie was a crossing point between the two countries. With the unification of Germany in 1990, Checkpoint Charlie became a museum.

Ethnic Diversity Within States

There is no perfect nation-state because the territory occupied by a particular ethnicity never corresponds precisely to the boundaries of countries. Nonetheless, some states are excellent examples of nation-states. For example, the ethnic composition of Japan is around 95 percent Japanese.

Figure 8-16 depicts an attempt by political scientist James Fearon to measure the extent of ethnic diversity in a country. States with the least diversity would be the best examples of nation-states. Many of the world's states with the least ethnic diversity are in Europe. On the other hand, most of the states that are most ethnically diverse are in Africa.

By the late twentieth century, many Europeans thought that ethnicity had been left behind as a relic of the past, such as wearing costumes to amuse tourists. Karl Marx wrote that nationalism was a temporary phenomenon because workers in one country would ultimately identify with working-class people in other countries instead of with an ethnicity.

In the twenty-first century, however, ethnic identity has once again become important in Europe. Former Yugoslavia was a prominent example of a failed nation-state in Europe. The breakup of Yugoslavia included a peaceful conversion of Slovenia in 1991 from a republic in multinational Yugoslavia to a nation-state (Figures 8-17 and 8-18). However, other portions of former Yugoslavia became nation-states only after ethnic cleansing and other atrocities, as discussed in Chapter 7.

The multinational states of Yugoslavia, Czechoslovakia, and the Soviet Union were broken up into multiple states. In Czechoslovakia, a multinational state was peacefully transformed in 1993 to two nation-states – Czechia and Slovakia. Slovaks comprise only 1 percent of Czechia's population and Czechs less than 1 percent of Slovakia's population.

Pause & Reflect 8.2.2 In the twenty-first century, what has been the general trend in Europe with regard to multinational states, nation-states, and ethnicities?

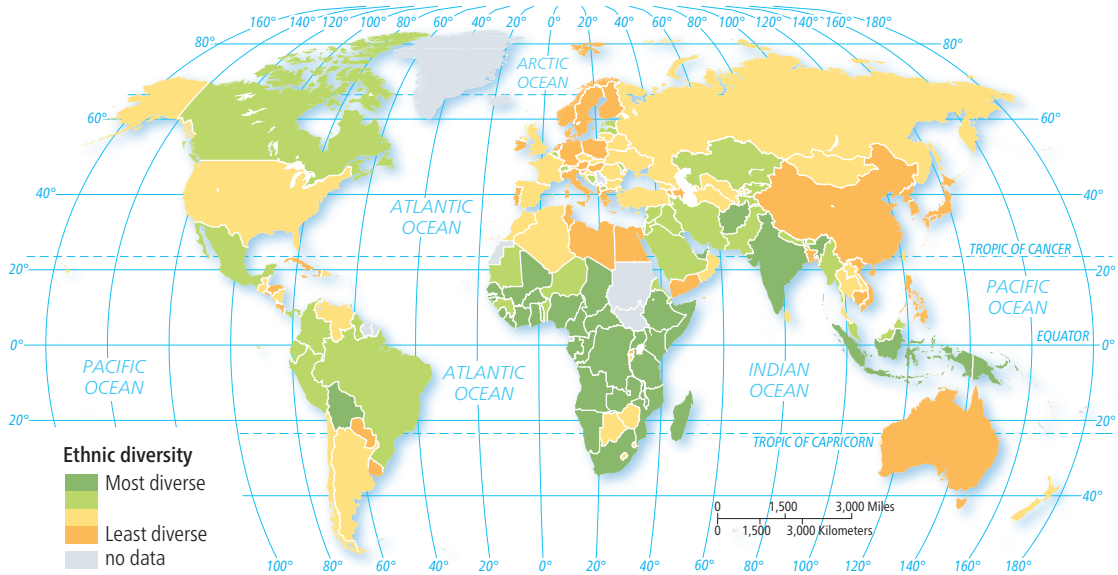


FIGURE 8-16 ETHNIC DIVERSITY Many of the best examples of nation-states are in Europe. The most ethnically diverse countries are primarily in Africa.

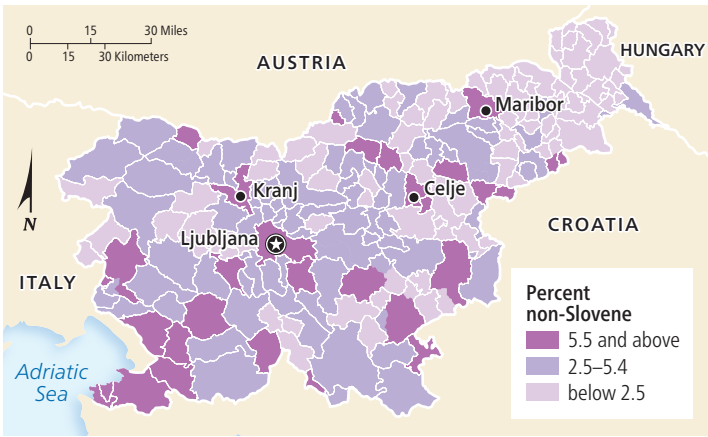


FIGURE 8-17 SLOVENIA A good example of a nation-state because people of Slovene ethnicity make up more than 80 percent of the country's population.

FIGURE 8-18 LJUBLJANA, SLOVENIA The castle on the hill was constructed in the eleventh century and rebuilt in the fifteenth century.

Nation-States in the Former Soviet Union

Learning Outcome 8.2.3 Describe challenges in creating nation-states in the former Soviet Union.

A **multinational state** is a state that contains more than one nation. During its existence between 1922 and 1991, the Union of Soviet Socialist Republics (U.S.S.R.) was a good example of a multinational state. The country consisted of 15 republics, based on 15 relatively numerous ethnicities. According to estimates a year before the breakup of the Soviet Union, Russians comprised 51 percent of the state's population, Ukrainians 16 percent, Uzbeks 6 percent, and the remaining 27 percent spread among more than 100 other ethnicities officially recognized by the Soviet government.

The breakup of the U.S.S.R. in 1991 resulted in the conversion of the 15 republics into 15 independent states (Figure 8-19). These 15 states consist of Russia plus four regional groupings. Some of these states are good examples of nation-states, and some are good examples of multinational states.

Three Caucasus States. Armenia and Azerbaijan are both statistically good examples of nation-states, but they have fought over demarcating boundaries between the two ethnic groups. The fighting has been for possession of Artsakh, an enclave within Azerbaijan that is 99.7 percent Armenian but was placed under Azerbaijan's control by the Soviet Union during the 1920s. Artsakh acts as an independent state, with a government enacting laws, but no other country recognizes Artsakh as a state.

Georgia is more ethnically diverse than its neighbors. Two areas occupied by Ossetian and Abkhazian ethnicities have declared independence from Georgia, but only Russia and a few other countries recognize South Ossetia and Abkhazia as independent countries.

Pause & Reflect 8.2.3 If Artsakh were recognized as a sovereign state, how would it compare in size to the microstates described earlier in this chapter?

Three Baltic States. Estonia, Latvia, and Lithuania are known as the Baltic states for their location on the Baltic Sea. They were independent countries between the end of World War I in 1918 and 1940, when the former Soviet Union annexed them under an agreement with Nazi Germany.

These three small neighboring Baltic countries have clear cultural differences and distinct historical traditions. Most Lithuanians are Roman Catholic and speak a language of the Baltic group within the Balto-Slavic branch of the Indo-European language family. Latvians are predominantly Protestant (Lutheran) with a substantial Roman Catholic minority, and they speak a language of the Baltic group. Most Estonians are Lutheran and speak a Uralic language related to Finnish.

Five Central Asian States. The five states in Central Asia carved out of the former Soviet Union display varying degrees of conformance to the principles of a nation-state. Together the five provide an important reminder that multinational states can be more peaceful than nation-states.

Turkmenistan and Uzbekistan are relatively stable nation-states. In contrast, Tajikistan is a nation-state that has suffered from a civil war between Tajiks, who were former Communists, and an unusual alliance of Muslim fundamentalists and Western-oriented intellectuals. Fifteen percent of the population was made homeless during a civil war that lasted from 1992 to 1997. A U.N. peacekeeping force has helped prevent a recurrence.

Kazakhstan is a relatively peaceful multinational state divided between Kazakhs, who comprise 70 percent of the population, and Russians, at 16 percent. Kazakhs are Muslims who speak a Turkic language.

Kyrgyzstan is a multinational state that has suffered from ethnic conflict. The population comprises 74 percent Kyrgyz, 15 percent Uzbek, 5 percent Russian, and 6 percent other ethnicities. The Kyrgyz and Uzbek peoples are both Muslims who speak Altaic languages. Nonetheless, conflict between the two ethnicities led to the overthrow of successive presidents in the first decade of the twenty-first century as well as violence in 2010 that included charges of ethnic cleansing of hundreds of thousands of Uzbeks by Kyrgyz.

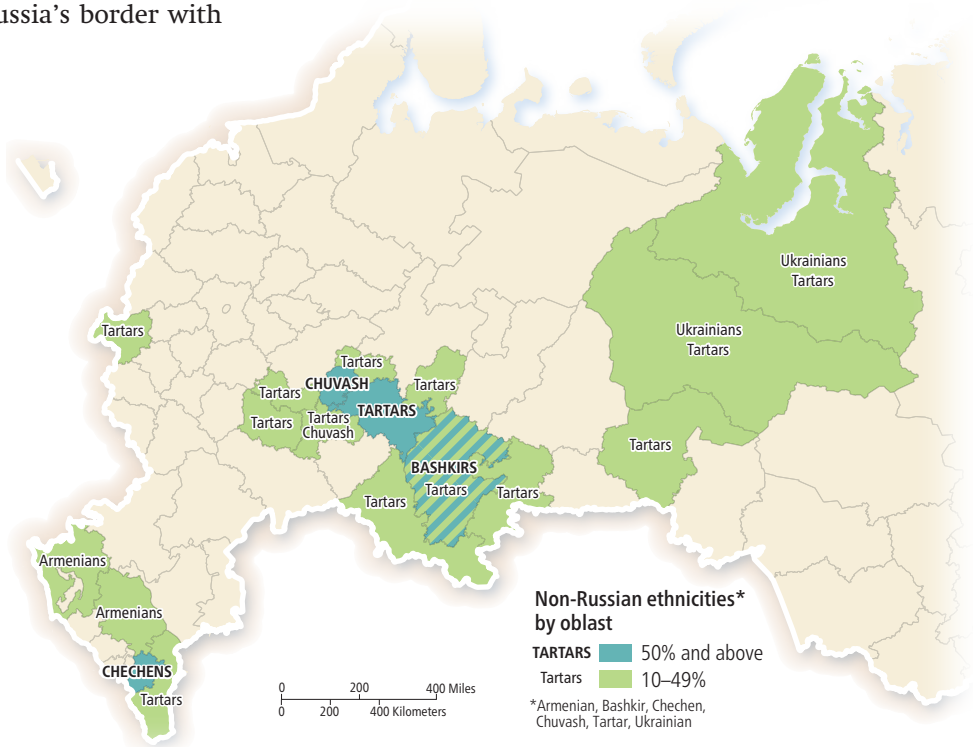
▲ **FIGURE 8-19 FORMER SOVIET UNION** The U.S.S.R. consisted of 15 republics that have become independent states.

Russia: The Largest Multinational State

With the breakup of the Soviet Union, Russia is now the world's largest multinational state. Russia comprises 78 percent ethnic Russians, but the 2010 census counted 193 ethnic groups among the remaining 22 percent. Russia classifies ethnicities primarily by language family.

Non-Russian ethnic groups are clustered in three principal locations (Figure 8-20). The largest cluster of non-Russian ethnic groups is located near Russia's border with Kazakhstan, between the Volga River and Ural Mountains. The ethnic groups in Siberia migrated there voluntarily in search of agricultural land or were forcibly relocated there as prisoners by the Russian government. Another important cluster of non-Russian ethnic groups is in the far southwest, along the border with the former Soviet republics of Azerbaijan and Georgia (Figure 8-21).

Russia's constitution grants autonomy over local government affairs to around two dozen of the most numerous ethnicities. Local government units with a large ethnic population are allowed to designate the ethnic language as an official language in addition to Russian. Nonetheless, independence movements are flourishing among several ethnicities despite efforts by Russia's government to stop them.



▲ **FIGURE 8-20 ETHNICITIES IN RUSSIA** Russians are clustered in western Russia, and the percentage declines to the south and east. The largest numbers of non-Russians are found between the Volga River and the Ural Mountains and near the southern borders.

Three European States. Belarusians, Ukrainians, and Russians speak similar East Slavic languages and trace their ethnic heritage to similar roots in medieval Europe. Belarusians and Ukrainians identified as ethnicities distinct from Russians when they were isolated from each other after invasions and conquests by Mongolians, Poles, and Lithuanians beginning in the thirteenth century. Russians conquered Belarus and Ukraine in the late eighteenth century, but after five centuries of exposure to non-Slavic influences, Belarusians and Ukrainians display sufficient cultural differences to consider themselves different than Russians.

After the breakup of the Soviet Union, prospects for a stable nation-state were favorable in independent Ukraine because it possessed economic assets, such as coal deposits, a steel industry, and proximity to developed countries of Western Europe. However, Ukraine's minority Russian population started an uprising in the eastern region of the country, where they were clustered. Russia invaded eastern Ukraine in 2014 and annexed Crimea, claiming that the majority of the Crimean people, who are ethnic Russians, supported the action. Not satisfied with seizing Crimea, Russia attacked the rest of Ukraine in 2022 in part because Russia's President Vladimir Putin claimed that Ukrainians were not ethnically distinct from Russians and therefore all of Ukraine should be part of the Russian state.

Moldovans are ethnically indistinguishable from Romanians. The territory (then called Moldavia) was part of Romania until the Soviet Union seized it in 1940.

▲ **FIGURE 8-21 RUSSIA AND GEORGIA** The fence prevents people from moving between Sochi, Russia (foreground), and Abkhazia, Georgia (background).

Colonies

Learning Outcome 8.2.4 Explain the concept of colonies, and describe their current distribution.

Nearly all Earth's land area has been allocated to a collection of around 200 sovereign states, but some territories remain that have not achieved self-determination and statehood. A **colony** is a territory that is legally tied to a sovereign state rather than being completely independent. In some cases, a sovereign state runs only the colony's military and foreign policy. In others, it also controls the colony's internal affairs.

Current Colonies

The United Nations identifies 17 places in the world that it calls "non–self-governing territories" (Figure 8-22). Of the 17, Western Sahara is by far the most extensive (252,000 square kilometers or 97,000 square miles) and most populous (around 600,000). The two next most populous are islands controlled by France: French Polynesia (283,000 inhabitants) (Figure 8-23) and New Caledonia (273,000 inhabitants). All colonies but Western Sahara are islands.

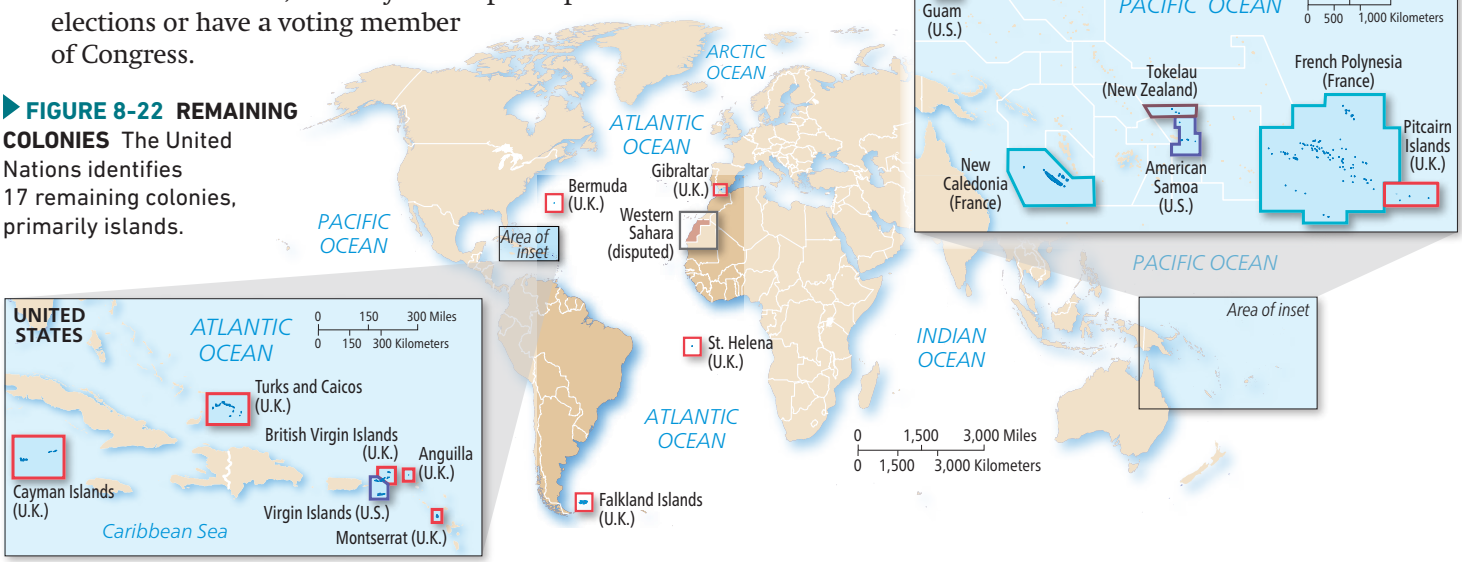
The least-populated colony is the Pitcairn Islands, a 47-square-kilometer (18-square-mile) possession of the United Kingdom. The colony (officially known as the Pitcairn, Henderson, Ducie, and Oeno Islands) is a group of four islands in the South Pacific settled in 1790 by British mutineers from the ship *Bounty*, commanded by Captain William Bligh. Today, the colony's 40 residents survive by selling postage stamps to collectors, as well as fish.

The U.N. list of colonies does not include territories that are uninhabited, such as Baker and Midway islands, controlled by the United States. The U.N. also does not list inhabited territories that it considers to have considerable autonomy in self-governing. For example, the U.N. does not classify these territories as colonies:

- **Puerto Rico.** The Commonwealth of Puerto Rico, an archipelago in the Caribbean Sea, is an unincorporated territory of the United States. Puerto Ricans are citizens of the United States, but they do not participate in U.S. elections or have a voting member of Congress.
- **Greenland.** The world's largest island, Greenland is a district within the Kingdom of Denmark. Greenland runs its internal affairs, but Denmark controls foreign affairs and defense.
- **Hong Kong & Macao.** The Hong Kong Special Administrative Region and Macao Special Administrative Region are attached to the People's Republic of China. Hong Kong was a colony of the United Kingdom until it reverted to China in 1997, and a year later, Portugal returned its colony of Macao to China. The two special administrative regions have some autonomy in economic matters, but China controls foreign affairs and defense and has significantly reduced the level of autonomy that the two regions are permitted to have.

Pause & Reflect 8.2.4 Do you agree that Puerto Rico should not be classified as a colony? What are two ways in which Puerto Rico's government could change to resolve the ambiguity of its status?

▲ **FIGURE 8-23 FRENCH POLYNESIA** The colonial capital Papeete is on Tahiti, one of 118 islands in the colony.

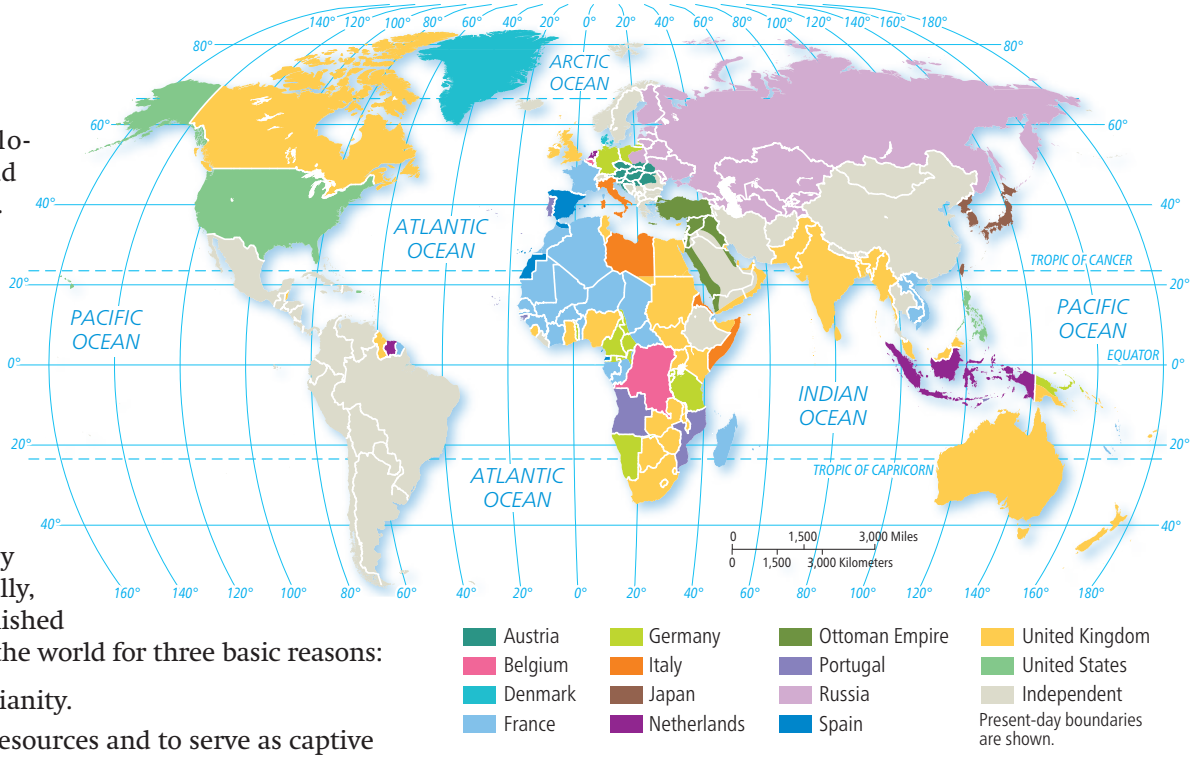


▶ **FIGURE 8-22 REMAINING COLONIES** The United Nations identifies 17 remaining colonies, primarily islands.

Colonialism

At one time, colonies were widespread over Earth's surface. European states came to control much of the world through **colonialism**, which is an effort by one country to establish settlements in a territory and to impose its political, economic, and cultural principles on that territory (Figure 8-24). Historically, European states established colonies elsewhere in the world for three basic reasons:

- To promote Christianity.
- To extract useful resources and to serve as captive markets for their products.
- To establish relative power through the number of colonies claimed.



▲ **FIGURE 8-24 COLONIAL POSSESSIONS, 1914** At the outbreak of World War I in 1914, European states held colonies in much of the world.

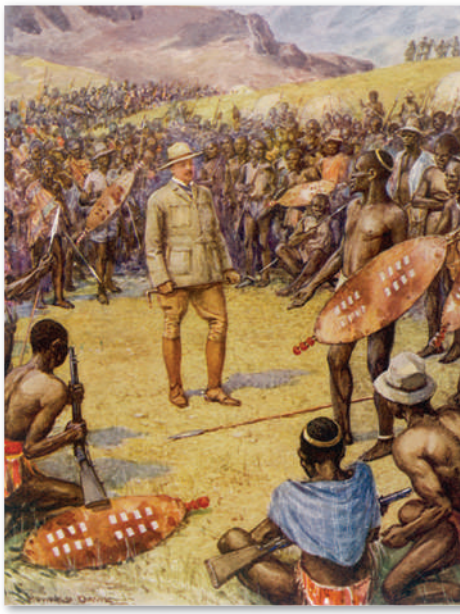
The colonial era began in the 1400s, when European explorers sailed westward for Asia but encountered and settled in the Western Hemisphere instead. Eventually, the European states lost most of their Western Hemisphere colonies: Independence was declared by the United States in 1776 and by most Latin American states between 1800 and 1824.

European states then turned their attention to Africa and Asia. At the Berlin Conference of 1884–1885, European states decided that they could convert most of Africa into their colonies, and they defined areas within Africa that each would control.

The United Kingdom planted colonies on every continent, including much of eastern and southern Africa, South and Southeast Asia, the South Pacific, and Canada. With by far the largest colonial empire, the British proclaimed that the "Sun never set" on their empire. Cecil Rhodes, a British imperialist, played a major role in extending British control through much of southern Africa (Figure 8-25). His treatment of indigenous people and attitudes of white racial superiority have been severely criticized in recent years (Figure 8-26).

France had the second-largest overseas territory, primarily in West Africa and Southeast Asia. France attempted to assimilate its colonies into French culture and educate an elite group to provide local administrative leadership. After independence from France, most of these former colonial leaders retained close ties with France.

Japan was the principal colonial power in Asia during the first half of the twentieth century. It controlled Korea, Taiwan, several smaller Pacific Ocean islands, and a portion of China. Japan's colonial control ended in 1945 with its defeat in World War II.



▲ **FIGURE 8-25 CECIL RHODES**

End of Colonialism

Most African and Asian colonies became independent after World War II. Only 15 African and Asian states were members of the United Nations when it was established in 1945, compared to 106 since 2011. The boundaries of the new states frequently coincide with former colonial provinces but not with the distribution of ethnicities. However successful the decolonization of Africa, the legacy of colonialism has been hard to shake.

▶ **FIGURE 8-26 DISMANTLING CECIL RHODES STATUE** The University of Cape Town, South Africa, removed a statue honoring Cecil Rhodes following a student protest movement called "Rhodes Must Fall."

KEY ISSUE

8.3 | Why Do States Have Distinctive Geographic Structure?

States are separated from each other by boundaries. Boundaries completely surround an individual state to mark the outer limits of its territorial control and to give it a distinctive shape. Boundaries interest geographers because the process of selecting their location is frequently difficult.

Boundaries Between States

Learning Outcome 8.3.1 Describe the types of cultural boundaries between states.

A **boundary** is an invisible line that marks the extent of a state's territory. Historically, frontiers rather than boundaries separated states. A **frontier** is a zone where no state exercises complete political control. It is a tangible geographic area, whereas a boundary is an infinitely thin line. Frontier areas were either uninhabited or sparsely settled. Frontiers between states have been replaced by boundaries. Modern communications systems permit countries to monitor and guard boundaries effectively, even in previously inaccessible locations.

Three Types of Boundaries

Boundaries are of three types:

- **Cultural boundaries** follow the distribution of cultural features, such as ethnicity, religion, and language (Figure 8-27).
- **Physical boundaries** coincide with significant features of the natural landscape, such as mountain ranges and rivers.
- **Geometric boundaries** are based on human constructs, such as a straight line and an arc along a latitude or longitude.

No other type of boundary is better or more "natural" than the others, and many boundaries are a combination of types.

Boundary locations can generate conflict, both within a country and with its neighbors. A boundary line, which must be shared by more than one state, is the only location where direct physical contact must take place between two neighboring states. Therefore, the boundary has the potential to become the focal point of conflict between them. The best boundaries are those to which all affected states agree, regardless of the rationale used to draw the line.

Four Types of Cultural Boundaries

Boundaries between countries are often placed to follow the distribution of cultural features. Geographers identify four types of cultural boundaries:

- A **superimposed boundary** is drawn on an area by a conquering or colonizing power that ignores existing cultural patterns. The division of Africa into independent states as the European powers dissolved their colonial empires resulted in numerous superimposed boundaries that ignored ethnic and other cultural borders.
- A **subsequent boundary** is established after the settlement in an area and is changed to accommodate developments such as war. An example of a subsequent boundary is the partition of the former Yugoslavia into several independent states, discussed in Chapter 7 (refer to Figure 7-72).
- A **relic boundary** is one that no longer functions but can still be detected on the cultural landscape. An example of a relic boundary is the Berlin Wall that once served as a boundary between East and West Germany but was dismantled when Germany was reunified in 1990 (refer to Figure 8-15 and ahead to Figure 8-75).
- A **consequent boundary** is drawn in order to separate groups based on ethnic, linguistic, religious, or economic differences. A consequent boundary is drawn between Greek and Turkish areas in Cyprus (refer ahead to Figures 8-28 and 8-29).

▲ **FIGURE 8-27 LANGUAGE BOUNDARY** The portion of the boundary between Canada and the United States that separates the Province of Québec and the U.S. States of Maine, New Hampshire, Vermont, and New York serves as a boundary between the predominance of the French and English languages (refer to Figure 5-39).

Cultural Boundaries: Ethnicity

Cyprus, the third-largest island in the Mediterranean Sea, contains two ethnicities: Greek and Turkish. Although the island is physically closer to Türkiye, Turks comprise only around 26 percent of the island's population, whereas Greeks account for around 72 percent. When Cyprus gained independence from Britain in 1960, its constitution guaranteed the Turkish minority a substantial share of elected offices and control over its own education, religion, and culture. But Cyprus has never peacefully integrated the Greek and Turkish ethnicities.

Several Greek Cypriot military officers who favored unification of Cyprus with Greece seized control of the government in 1974. Shortly after the coup, Türkiye invaded Cyprus to protect the Turkish Cypriot minority. The Greek Cypriot coup leaders were removed within a few months, and an elected government was restored, but the Turkish army remained on Cyprus. The northern one-third of the island controlled by Türkiye declared itself the independent Turkish Republic of Northern Cyprus in 1983, but only Türkiye recognizes it as a separate state (Figure 8-28).

A barrier was constructed between the two areas, and a demilitarized buffer zone patrolled by the United Nations was delineated across the entire island (Figure 8-29). Traditionally, the Greek and Turkish Cypriots had mingled, but after the barrier and buffer zone were established, the two ethnicities became geographically isolated. The northern part of the island is now overwhelmingly Turkish, and the southern part is overwhelmingly Greek. Approximately one-third of the island's Greeks were forced to move from the region controlled by the Turkish army, whereas nearly one-fourth of the Turks moved from the region now regarded as the Greek side.

The two sides have been brought closer in recent years. A portion of the barrier was demolished, and after three decades, each ethnic group could again cross to the other side. The European Union accepted the entire island of Cyprus as a member in 2004.

▲ **FIGURE 8-28 ETHNIC BOUNDARY: CYPRUS** Since 1974, Cyprus has been divided into Greek and Turkish areas, separated by a United Nations buffer zone. The United Kingdom, the colonial ruler of Cyprus until 1960, maintains two military bases on the island.

Religion was also used to some extent to draw the boundary between two states on the island of Eire (Ireland). Most of the island became an independent country, but the northeast – now known as Northern Ireland – remained part of the United Kingdom. Roman Catholics comprise 78 percent of the population in the 26 counties that joined the Republic of Ireland, compared with only 46 percent in the six counties of Northern Ireland (refer to Figure 6-4).

Language is an important cultural characteristic for drawing boundaries, especially in Europe. France, Portugal, and Spain are examples of European states that coalesced around distinctive languages before the nineteenth century. Germany and Italy emerged in the nineteenth century as states unified by language. A language boundary separates the United States from Canada's Québec Province (refer to Figure 8-27).

Pause & Reflect 8.3.1 Referring to Chapters 5 and 6, what other cultural boundaries run through the middle of states in Europe?

Cultural Boundaries: Language & Religion

Cultural boundaries between countries have been placed where possible to separate speakers of different languages, followers of different religions, or members of different ethnicities. Religious differences often coincide with boundaries between states, but in only a few cases has religion been used to select boundary lines. The most notable example was in South Asia, when the British partitioned India into two states on the basis of religion. The predominantly Islamic portions were allocated to Pakistan, whereas the predominantly Hindu portions became the independent state of India.

▼ **FIGURE 8-29 ETHNIC BOUNDARY: CYPRUS GREEN LINE** The city of Nicosia is divided between the Turkish side (foreground) and Greek side (background).

Physical Boundaries

Learning Outcome 8.3.2 Describe types of physical boundaries between states.

Physical features on Earth's surface can make good boundaries because they are easily seen, both on a map and on the ground. A physical feature that serves as a boundary is known as an **antecedent boundary** because it existed before the present settlement. Three types of physical elements serve as boundaries between states: deserts, mountains, and water.

Desert Boundaries

A boundary drawn in a desert can effectively divide two states because deserts are hard to cross and sparsely inhabited. Desert boundaries are common in Africa and Asia. In North Africa, the Sahara has in most cases proved to be a stable physical boundary (as well as a geometric boundary) separating Algeria, Libya, and Egypt on the north from Mauritania, Mali, Niger, Chad, and the Sudan on the south. Desert borders also are found in South America (Figure 8-30).

Mountain Boundaries

Mountains can be effective boundaries if they are difficult to cross. Contact between nationalities living on opposite sides of mountains may be limited or completely impossible if passes are closed by winter storms. Mountains are also useful boundaries because they are rather permanent and are usually sparsely inhabited.

Mountains do not always provide for the amicable separation of neighbors. Argentina and Chile agreed to be divided by the crest of the Andes Mountains but could not decide on the precise location of the crest (Figure 8-31). Was the crest a jagged line, connecting mountain peaks to mountain peaks? Or was it a curving line following the continental divide (the continuous ridge that divides rainfall and snowmelt between flow toward the Atlantic or Pacific)? The two countries almost fought a war over the boundary line. But with the help of U.S. mediators, they finally decided on the line connecting adjacent mountain peaks.

▼ **FIGURE 8-30 DESERT BOUNDARY** Bolivia-Chile border.

▲ **FIGURE 8-31 MOUNTAIN BOUNDARY** Paso Internacional Los Libertadores, also called Cristo Redentor, is a mountain pass in the Andes Mountains between Argentina and Chile.

Water Boundaries

Rivers, lakes, and oceans are the physical features most commonly used as boundaries (Figure 8-32). Water boundaries are readily visible on maps and aerial imagery. Historically, water boundaries offered good protection against attack from another state because an invading state had to transport its troops by air or ship and secure a landing spot in the country being attacked. The state being invaded could concentrate its defense at the landing point.

Water boundaries are especially common in East Africa: The boundary between the Democratic Republic of Congo and Uganda runs through Lake Albert. The boundary separating Kenya, Tanzania, and Uganda runs through Lake Victoria. The boundary separating Burundi, the Democratic Republic of Congo, Tanzania, and Zambia runs through Lake Tanganyika. The boundary between Malawi and Mozambique runs through Lake Nyasa, which is also known as Lake Malawi.

Water boundaries may seem to be set permanently, but the precise position of water may change over time. Rivers, in particular, can slowly change their course. The Rio Grande, the river separating the United States and Mexico, has frequently meandered from its previous course since it became part of the boundary in 1848. Land that had once been on the U.S. side of the boundary came to be on the Mexican side and vice versa. The United States and Mexico have concluded treaties that restore land affected by the shifting course of the river to the country in control at the time of the original nineteenth-century delineation. The International Boundary and Water Commission, jointly staffed by the United States and Mexico, oversees the border treaties and settles differences.

▼ **FIGURE 8-32 WATER BOUNDARIES** The confluence of the Iguazu River (background) and Paraná River (foreground) is the boundary between Paraguay (foreground), Brazil (left), and Argentina (right).

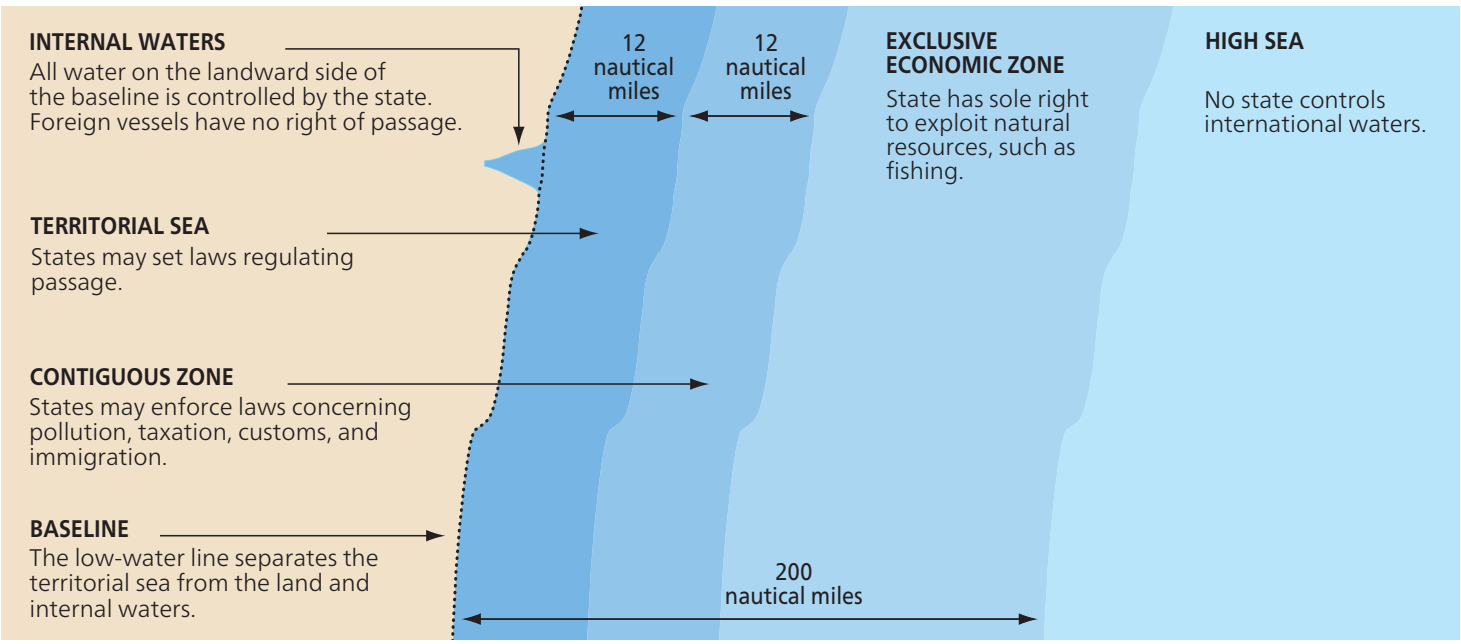
The Law of the Sea

The United Nations Convention on the Law of the Sea defines the rights and responsibilities of countries with respect to the use of the world's oceans and the management of marine resources. It has been ratified by 167 states; an additional 14 states, including the United States, have signed but not ratified the convention. Disputes can be taken to a tribunal for the Law of the Sea or to the International Court of Justice. The Convention identifies three types of water boundaries (Figures 8-33 and 8-34):

- **Territorial sea.** Up to 12 nautical miles from shore (about 22 kilometers or 14 land miles), a state may set laws regulating passage by ships registered in other states.
- **Contiguous zone.** Between 12 and 24 nautical miles from shore, a state may enforce laws concerning pollution, taxation, customs, and immigration.
- **Exclusive economic zone.** Between 24 and 200 nautical miles, a state has the sole right to the fish and other marine life.

Through enforcement of the exclusive economic zone, states bordering an ocean are able to claim vast areas of the ocean for control of valuable resources. This has become especially important in the delineation of boundaries in the polar regions.

Pause & Reflect 8.3.2 What examples have you seen thus far in this chapter of physical features that have not served as peaceful boundaries?



▲ **FIGURE 8-33 MARITIME ZONES DEFINED BY THE LAW OF THE SEA** These rules apply except where countries with overlapping claims negotiate compromise boundaries.

▶ **FIGURE 8-34 THE LAW OF THE SEA APPLIED TO AUSTRALIA AND NEIGHBORS**

Geometric Boundaries

Learning Outcome 8.3.3 Describe types of geometric boundaries between states.

A world map shows two regions where geometric boundaries are especially prominent: North America and North Africa. These boundaries are peaceful now but were not always so in the past.

Geometric Boundaries: North America

Part of the northern U.S. boundary with Canada is a 2,030-kilometer (1,260-mile) arc along 49° north latitude, running from Lake of the Woods between Minnesota and Manitoba to the Strait of Georgia between Washington State and British Columbia. Québec's boundary with New York and Vermont is also geometric, along 45° north latitude (Figure 8-35). The two countries share an additional 1,040-kilometer (650-mile) geometric boundary between Alaska and Yukon along the north-south arc of 141° west longitude.

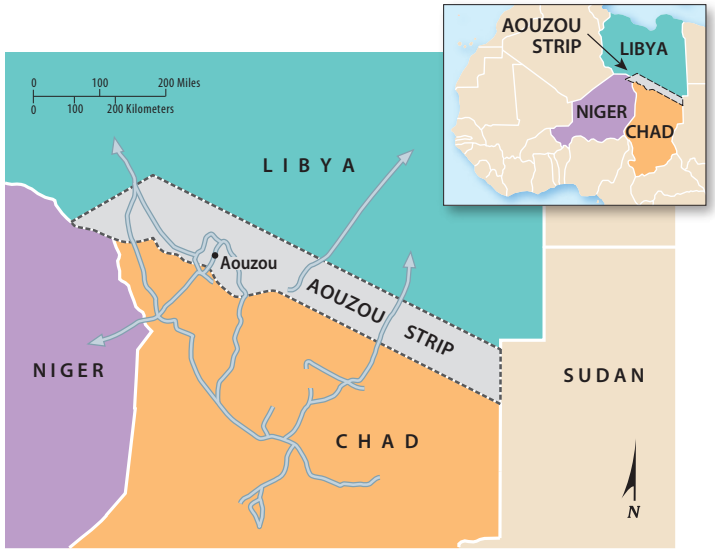
The U.S.–Canada boundary was established through a series of treaties between 1783 and 1903 between the United States and the United Kingdom, which then still controlled Canada. During the 1840s, many Americans called for the border between the Rockies and the Pacific to be set further north, at 54°40' north latitude (the southern tip of Alaska). Advocates of the northern line used the slogan "54-40 or fight," but the Oregon Treaty settled the dispute peacefully in 1846.

Geometric Boundaries: North Africa

Boundaries in Africa between Algeria, Libya, and Egypt on the north and Mali, Niger, Chad, and Sudan on the south are for the most part geometric. Many of these boundaries are a legacy of treaties among European countries to divide up much of Africa into colonies. For example, the 1,000-kilometer (600-mile) boundary between Chad and Libya is a straight line drawn across the desert in 1899 by the French and British to set the northern limit of French colonies in Africa.

As an independent country, Libya claimed that the straight line should be 100 kilometers (60 miles) to the south, to include territory known as the Aouzou Strip (Figure 8-36). Citing an agreement in 1935 between France and Italy, which then controlled much of Libya, Libya seized the Aouzou Strip in 1973. Chad regained control of the strip in 1987, and Libya withdrew its troops after the International Court of Justice ruled in favor of Chad's claim in 1994.

Pause & Reflect 8.3.3 Where is the U.S.–Canada boundary not based on geometry?



▲ **FIGURE 8-36 GEOMETRIC BOUNDARY: NORTH AFRICA** The boundary between Chad and Libya is a straight line, drawn by European states early in the twentieth century, when the area comprised a series of colonies. In 1994, the International Court of Justice ruled 16 to 1 that Aouzou Strip belonged to Chad.

◀ **FIGURE 8-35 GEOMETRIC BOUNDARY: NORTH AMERICA** The border separates Derby Line, Vermont (left), and Stanstead, Québec (right).

Geometric Boundaries: Polar Regions

The South Pole region contains the only large landmass on Earth's surface that is not part of a state. Seven states claim portions of the South Pole region: Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom. These claims are divided geometrically, following meridians that converge on the South Pole (Figure 8-37). Australia claims around 45 percent of Antarctica and Norway around 20 percent. The United States, Russia, and a number of other states do not recognize the claims of any country to Antarctica.

Some of the territorial claims are overlapping and conflicting, and on the other hand, some of the South Pole region is unclaimed by any state. The Antarctic Treaty, signed by twelve states in 1959, and currently signed by 54 states, provides a legal framework for managing Antarctica. States may establish research stations there for scientific investigations, but no military activities are permitted. In addition to the countries with territorial claims, Brazil, Germany, India, Italy, Japan, Russia, South Africa, South Korea, the United States, and Uruguay maintain research stations in Antarctica.

As for the North Pole and Arctic Ocean, the 1982 United Nations Convention on the Law of the Sea keeps the North Pole and the seas immediately surrounding it from being claimed by any country. However, the Law of the Sea permitted countries to submit claims inside the Arctic Circle by 2009 (Figure 8-38). Canada, Denmark, Iceland, Norway, Russia, and the United States make conflicting claims.

The heart of the dispute is the Lomonosov Ridge, which runs 1,800 kilometers (1,100 miles) across the polar region. The ridge rises several thousand meters above the floor of the Arctic Sea and in some places is only a few hundred meters below the current sea level. Russia and Denmark (which controls Greenland) both claim the Lomonosov Ridge as an extension of their respective landmasses. The territorial claims around the North Pole are based on differing interpretations of the Law of the Sea.

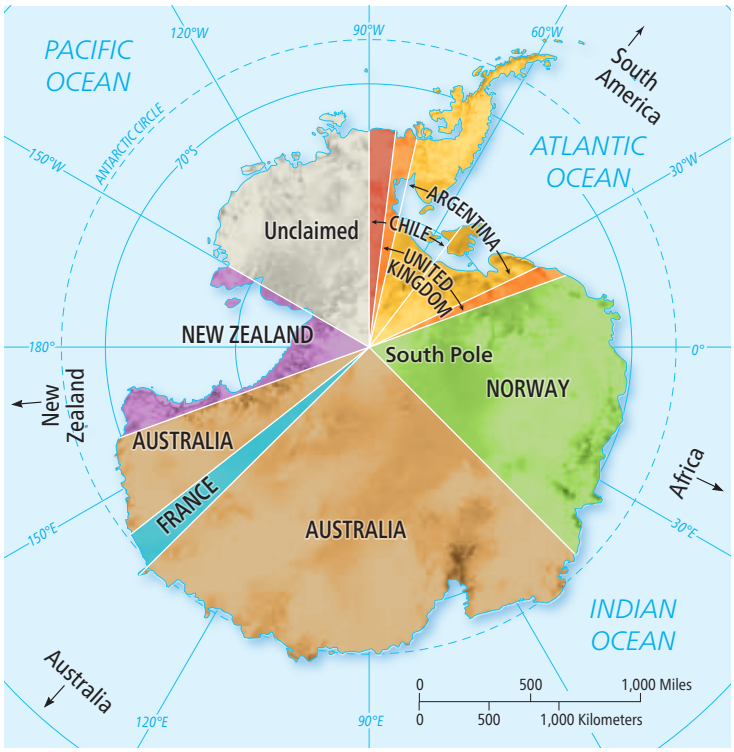


FIGURE 8-37 NATIONAL CLAIMS TO ANTARCTICA Portions of Antarctica are claimed by Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom; claims by Argentina, Chile, and the United Kingdom are conflicting.

FIGURE 8-38 NATIONAL CLAIMS TO THE ARCTIC OCEAN Under the Law of the Sea Treaty of 1982, countries have submitted claims to territory inside the Arctic Circle. Some of these claims overlap.

Shapes of States

Learning Outcome 8.3.4 Describe the five shapes of states.

Countries have one of five basic shapes – compact, elongated, prorupted, fragmented, or perforated – and examples of each can be seen in sub-Saharan Africa. Each shape displays distinctive characteristics and challenges.

The shape of a state can have value as a centripetal force, which was defined in Chapter 5 as a cultural value that tends to unify people. For example, the outline of the United States or Canada is part of its unique identity. The shape can also ease internal administration and encourage social unity.

The shape of a state can also be a centrifugal force, which was defined in Chapter 5 as a cultural value that tends to pull people apart. Because the shape establishes the length of its boundaries with other states, the shape affects the potential for conflict with neighbors. The shape can also add to administrative difficulties and exacerbate conflict among people living in different regions of the country.

Compact States: Efficient

In a **compact state**, the distance from the center to any boundary does not vary significantly. An ideal theoretical compact state would be shaped like a circle, with the capital at the center and with the shortest possible boundaries to defend. Examples of compact states in sub-Saharan African include Burundi, Kenya, Rwanda, and Uganda (Figure 8-39).

▲ **FIGURE 8-39 EXAMPLES OF COMPACT STATES: BURUNDI, KENYA, RWANDA, AND UGANDA**

Compactness can be a strong centripetal force in smaller states because good communications can be more easily established with all regions, especially if the capital is located near the center. However, compactness does not necessarily mean peacefulness, as compact states are just as likely as others to experience civil wars and ethnic rivalries.

Prorupted States: Access or Disruption

An otherwise compact state with a large projecting extension is a **prorupted state.** Proruptions are created for two principal reasons, and examples of both are found in sub-Saharan Africa (Figure 8-40):

- **To provide a state with access to a resource.** The Democratic Republic of Congo has a 500-kilometer (300-mile) proruption to the west along the Zaire (Congo) River. The Belgians created the proruption to give their colony access to the Atlantic.
- **To separate two states that otherwise would share a boundary.** Namibia has a 500-kilometer (300-mile) proruption to the east called the Caprivi Strip. When Namibia was a colony of Germany, the proruption disrupted communications among the British colonies of southern Africa. It also provided the Germans with access to the Zambezi, one of Africa's most important rivers.

▲ **FIGURE 8-40 EXAMPLES OF PRORUPTED STATES: DEMOCRATIC REPUBLIC OF THE CONGO AND NAMIBIA**

Elsewhere, Afghanistan similarly has a proruption approximately 300 kilometers (200 miles) long and as narrow as 20 kilometers (12 miles) wide, created by the British to prevent Russia from sharing a border with Pakistan.

Perforated State: South Africa

A state that completely surrounds another one is a **perforated state**. The surrounded state may face problems of dependence on, or interference from, the surrounding state. A clear example in sub-Saharan Africa is South Africa, which completely surrounds Lesotho, which is a compact state (Figure 8-41). Lesotho must depend almost entirely on South Africa for the import and export of goods. Dependency on South Africa was especially difficult for Lesotho when South Africa had a government controlled by Whites who discriminated against the Black majority population.

▲ **FIGURE 8-41 EXAMPLE OF PERFORATED STATE: SOUTH AFRICA**

Elongated States: Potential Isolation

A handful of **elongated states** have a long and narrow shape. Elongated states may suffer from poor internal communications. A region located at an extreme end of the elongation might be isolated from the capital, which is usually placed near the center. Examples in sub-Saharan Africa include:

- The Gambia, which extends along the banks of the Gambia River about 500 kilometers (300 miles) east–west but is only about 25 kilometers (15 miles) north–south (Figure 8-42). The shape was determined in the late nineteenth century, when the British controlled the mouth of the river and the French most of the surrounding area.
- Malawi measures about 850 kilometers (530 miles) north–south but only 100 kilometers (60 miles) east–west. In 1891, the British declared the territory the British Central Africa Protectorate, with the British controlling its foreign and military affairs and a local government controlling its internal affairs. The British created the protectorate in order to deter Portuguese on the west side of Lake Malawi from staking their own claim. Malawi ultimately gained independence from the United Kingdom in 1964.

▲ **FIGURE 8-42 EXAMPLE OF ELONGATED STATE: THE GAMBIA**

Fragmented States: Problematic

A **fragmented state** includes several discontinuous pieces of territory. Technically, all states that have offshore islands as part of their territory are fragmented. However, fragmentation is particularly significant for some states that face problems and costs associated with communications and maintaining national unity.

▲ **FIGURE 8-43 EXAMPLE OF FRAGMENTED STATE: ANGOLA**

There are two kinds of fragmented states, and both can be seen in sub-Saharan Africa (Figure 8-43):

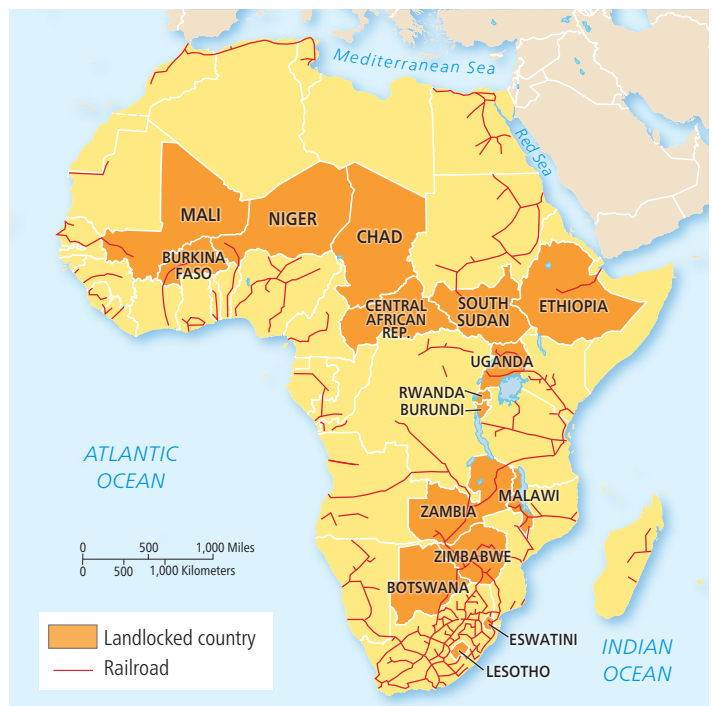
- **Fragmented by other states.** Angola is divided into two fragments by the Democratic Republic of Congo's proruption. An independence movement is trying to detach Cabinda as a separate state from Angola, with the justification that its population belongs to distinct ethnic groups.
- **Fragmented by water.** Tanzania was created in 1964 as a union of the island of Zanzibar with the mainland territory of Tanganyika. Although home to different ethnic groups, the two entities agreed to join together because they shared common development goals and political priorities.

Landlocked States

A **landlocked state** lacks a direct outlet to the sea when it is completely surrounded by other countries. Direct access to an ocean is critical to states because it facilitates international trade. Bulky goods, such as petroleum and vehicles, are transported long distances by ship, so a country needs access to a seaport to transfer goods between land and sea. A landlocked state must arrange to use another country's seaport.

Landlocked states are common in Africa, where 16 of the continent's 54 states have no direct ocean access (Figure 8-44). The prevalence of landlocked states in Africa is a remnant of the colonial era, when Britain and France controlled extensive regions that were eventually divided into independent states without regard for whether they were landlocked. The European powers built railroads in their colonial empires to connect the interior of Africa with the sea. Railroads moved minerals from interior mines to seaports, and in the opposite direction, rail lines carried mining equipment and supplies from seaports to the interior.

Pause & Reflect 8.3.4 Name a landlocked state not in Africa.



▲ **FIGURE 8-44 LANDLOCKED STATES IN AFRICA**

Electoral Geography

Learning Outcome 8.3.5 Explain the practice of gerrymandering and ways in which it is done.

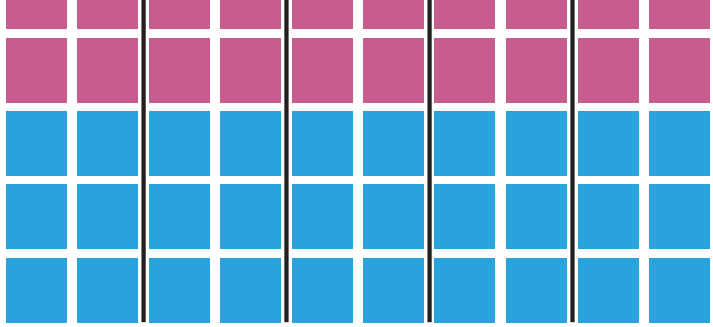
In democracies, politics must follow legally prescribed rules. But all parties to the political process can find ways of bending those rules to their advantage. A case in point is the drawing of legislative district boundaries.

The boundaries separating legislative districts within the United States and other countries are redrawn periodically to ensure that each district has approximately the same population. Boundaries must be redrawn because migration inevitably results in some districts gaining population and others losing population. The 435 districts of the U.S. House of Representatives are redrawn every 10 years, following the Census Bureau's release of official population figures.

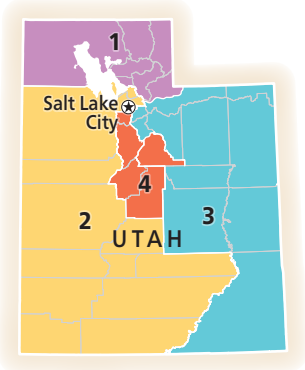
Gerrymandering

Redrawing legislative boundaries to benefit the party in power is called **gerrymandering**. Gerrymandering takes two forms:

- **Cracking.** Like-minded voters are spread across several districts to prevent them from reaching a majority in any of them, thus wasting their votes (Figures 8-45 and 8-46).
- **Packing.** Like-minded voters are stacked in one district to prevent them from affecting elections in other districts (Figures 8-47, 8-48, and 8-49).

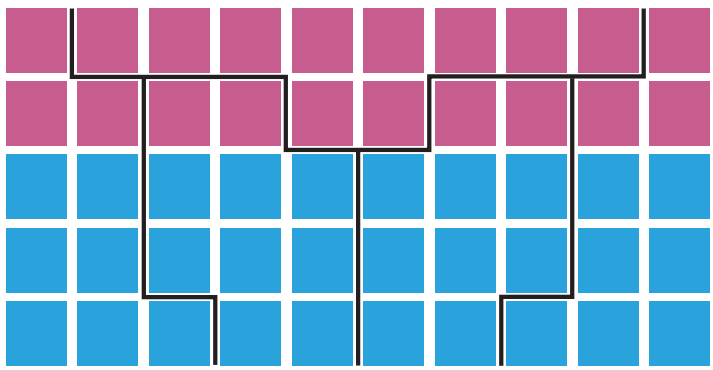


▲ **FIGURE 8-45 GERRYMANDERING: CRACKING** Like-minded voters are spread across many districts as a minority. Assume there are 50 voters, 20 supporters of the Red Party and 30 supporters of the Blue Party. If the Blue Party controls the redistricting process, it could create five districts all with slender majorities of Blue Party voters. As a result, the votes of all Red Party supporters are wasted.



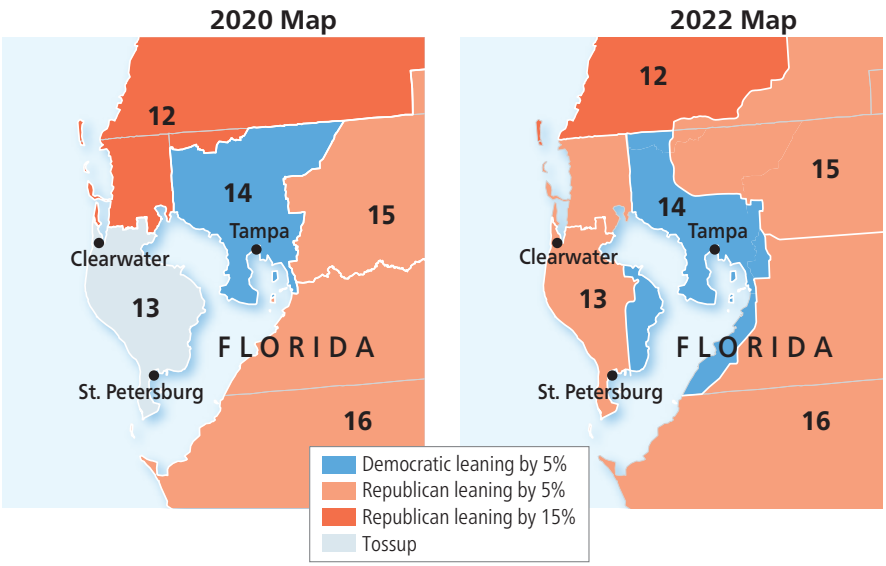
◀ **FIGURE 8-46 GERRYMANDERING CRACKING EXAMPLE** Salt Lake City, which is home to relatively progressive voters in an otherwise conservative-leaning state, is cracked among several Congressional Districts.

Pause & Reflect 8.3.5 What challenges do voters and elected officials face when a district is not compact?



▶ **FIGURE 8-47 GERRYMANDERING: PACKING** Like-minded voters are stacked into a few districts. Assume there are 50 voters, 20 supporters of the Red Party and 30 supporters of the Blue Party. If the Blue Party controls the redistricting process, it could pack most of the Red Party voters into one district with an overwhelming majority, leaving four districts with solid Blue Party majorities.

▶ **FIGURE 8-48 TAMPA BAY AREA CONGRESSIONAL DISTRICTIONS 2020** In 2020, the Democrat won 53 percent of the votes in District 13. In 2022, after gerrymandering, the Republican won 53 percent of the votes in District 13.



◀ **FIGURE 8-49 GERRYMANDERING PACKING EXAMPLE** In Florida, a large percentage of the Tampa Bay area's Democratic voters were packed into District 14. District 13, which elected a Democrat in 2020, was changed to a Republican-leaning district by adding Republican voters from District 12 and transferring some of District 13's Democratic voters living west of Tampa Bay to District 14, which is otherwise located east of Tampa Bay.

State Variations in Gerrymandering

The term *gerrymandering* was named for Elbridge Gerry (1744–1814), governor of Massachusetts (1810–1812) and vice president of the United States (1813–1814). As governor, Gerry signed a bill that redistricted the state to benefit his party. An opponent observed that an oddly shaped new district looked like a "salamander," whereupon another opponent responded that it was a "gerrymander." A newspaper subsequently printed a cartoon of a monster named "gerrymander" with a body shaped like the district (Figure 8-50).

▲ **FIGURE 8-50 THE ORIGINAL GERRYMANDERING CARTOON**

The job of redrawing boundaries in most European countries is entrusted to independent commissions. Such commissions typically try to create compact homogeneous districts without regard for voting preferences or incumbents. Seven of the 44 U.S. states with multiple congressional districts utilize a nonpartisan commission to draw the boundaries: Arizona, California, Colorado, Idaho, Montana, Michigan, and Virginia.

In most U.S. states, the job of redrawing boundaries is entrusted to the state legislature or a commission comprising elected officials. The political party in control of the state legislature naturally attempts to redraw boundaries to improve the chances that its candidates will win. Geographic Information System (GIS) has been an especially useful tool for creating gerrymandered districts. As a result of gerrymandering, less than one-tenth of congressional seats across the United States are competitive on any given election year, making a shift of more than a few congressional seats unlikely from one election to another in the United States, except in unusual circumstances.

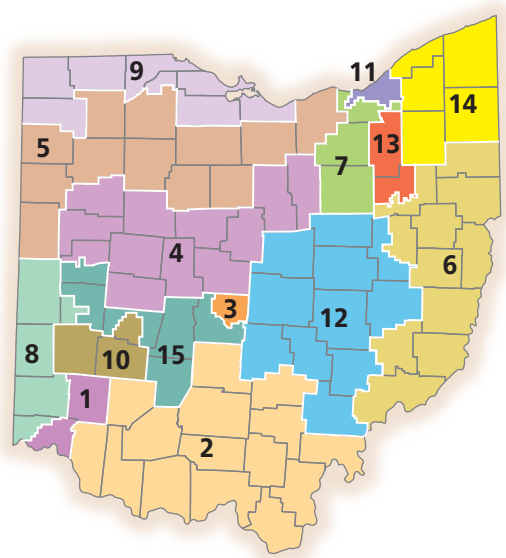
One measure of gerrymandering is the extent to which districts follow the principle of compactness. As with a compact state discussed earlier in the chapter (refer to Figure 8-39), a **compact district** is a local government district in which the residents live as near to one another as possible, and the distance from the center to any boundary varies as little as possible. A gerrymandered, local-government district typically has a shape that is elongated, prorupted, or perforated rather than compact (refer to Figures 8-40, 8-41, and 8-42). Most states require some form of compactness in drawing districts.

Packing has been especially useful for creating districts inclined to elect people of color. Because the two largest ethnic groups in the United States (Black Americans and most Hispanic Americans other than Cubans) tend to vote Democratic – in some elections more than 90 percent of Black Americans vote Democratic – creating a majority Black district virtually guarantees election of a Democrat. Republicans support a "packed" Democratic district because they are better able to draw boundaries that are favorable to their candidates in the rest of the state.

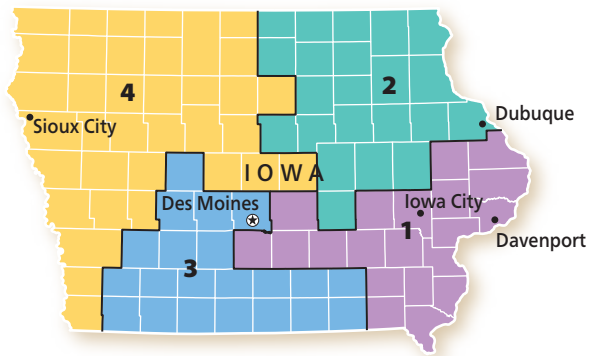
The states redistricted after the 2020 census with the most gerrymandering were judged by the Princeton Gerrymandering Project to be Florida, Illinois, Maryland, New York, Ohio, Oregon, Texas, and Wisconsin. The states redistricted after the 2020 census with the least gerrymandering were judged by the Princeton Gerrymandering Project to be Arizona, Colorado, Michigan, and Virginia.

Ohio: Substantial Gerrymandering. Ohio is one of the most gerrymandered states. A large share of the state's Black population is packed into the Eleventh Congressional District and cracked between the First and Eighth Congressional Districts (Figure 8-51). The Ohio Supreme Court ruled the map unconstitutional, but a federal court approved it anyway.

Iowa: Minimal Gerrymandering. Iowa is one of the least gerrymandered states. The boundaries, drawn by an independent commission, minimize dividing counties into more than one Congressional district (Figure 8-52). Iowa's commission is required to draw districts that are not oddly shaped.



▲ **FIGURE 8-51 SUBSTANTIAL GERRYMANDERING IN OHIO**



▲ **FIGURE 8-52 MINIMAL GERRYMANDERING IN IOWA** Congressional district boundaries for elections in 2022 through 2030.

KEY ISSUE

8.4 | Why Do States Face Threats?

An increasing number of states of the world are judged to be democracies. However, democracies face threats both from non-democratic states and from terrorist organizations not affiliated with particular states. The proliferation of weapons of mass destruction add to the threats faced by democracies.

Terrorist Attacks Against the United States

Learning Outcome 8.4.1 Explain the concept of terrorism, and cite U.S. examples.

Terrorism is the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation. International organizations concerned with terrorism, including the Institute for Economics & Peace and the National Consortium for the Study of Terrorism and Responses to Terrorism (START), have developed criteria that must be met for an incident to be terrorism:

1. The incident must be intentional, the result of a conscious calculation on the part of a perpetrator.
2. The incident must entail some level of violence or threat of violence, including property damage as well as violence against people.
3. Acts of terrorism conducted by one state against another state are not included.

In addition, two of the following three criteria must also be met in order for a violent act to be considered terrorism:

1. The violent act was aimed at attaining a political, economic, religious, or social goal.
2. The violent act included evidence of an intention to coerce, intimidate, or convey some other message to a larger audience other than to the immediate victims.
3. The violent act was outside the precepts of international humanitarian law.

The term *terror* (from the Latin "to frighten") was first applied to the period of the French Revolution between March 1793 and July 1794, known as the Reign of Terror. In the name of protecting the principles of the revolution, the Committee of Public Safety, headed by Maximilien Robespierre, guillotined several thousand of its political opponents. In modern times, the term *terrorism* has been applied to actions by groups operating outside government rather than to groups of official government agencies, although some governments provide military and financial support for terrorists.

Terrorism differs from assassination and other acts of political violence in that attacks are aimed at ordinary people rather than at military targets or political leaders. Terrorists consider all citizens of a country responsible for government actions and policies that they oppose, so they view civilians as legitimate targets.

September 11, 2001, Attacks

The most dramatic terrorist attacks against the United States occurred on September 11, 2001 (Figure 8-53). The 110-story twin towers of the World Trade Center in New York City, were destroyed, and the Pentagon, near Washington, D.C., was damaged. The attacks resulted in 2,977 civilian fatalities:

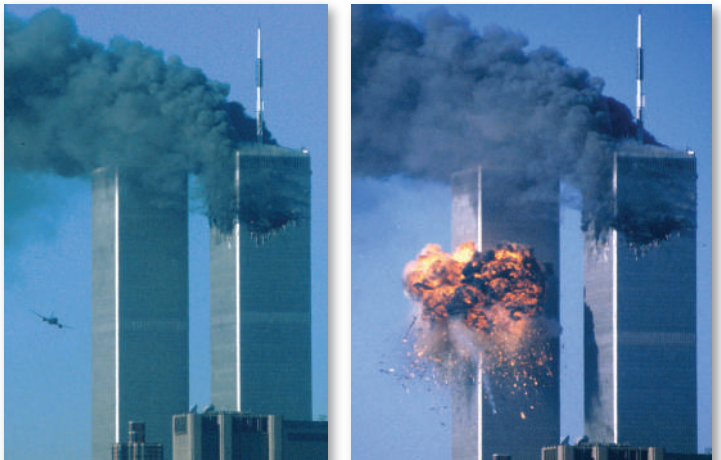
- 88 (77 passengers and 11 crew members) on American Airlines Flight 11, which crashed into World Trade Center Tower 1 (North Tower).
- 60 (51 passengers and 9 crew members) on United Airlines Flight 175, which crashed into World Trade Center Tower 2 (South Tower).
- 2,605 at the World Trade Center.
- 59 (53 passengers and 6 crew members) on American Airlines Flight 77, which crashed into the Pentagon.
- 125 at the Pentagon.
- 40 (33 passengers and 7 crew members) on United Airlines Flight 93, which crashed near Shanksville, Pennsylvania, after passengers fought with terrorists on board, preventing another attack on Washington, D.C.

In addition, 19 terrorists died on the four hijacked airplanes. Responsible or implicated in most of the anti-U.S. terrorism during the 1990s, as well as the September 11, 2001, attack, was the al-Qaeda international terrorist network.

Pause & Reflect 8.4.1 How has travel in the United States been affected by the 9/11 attacks?

FIGURE 8-53 TERRORIST ATTACK ON THE WORLD TRADE CENTER, SEPTEMBER 11, 2001 (a) At 9:03 a.m., United Flight 175 approaches World Trade Center Tower 2 and (b) crashes into it. Tower 1 is already burning from the crash of American Flight 11 at 8:45 a.m.

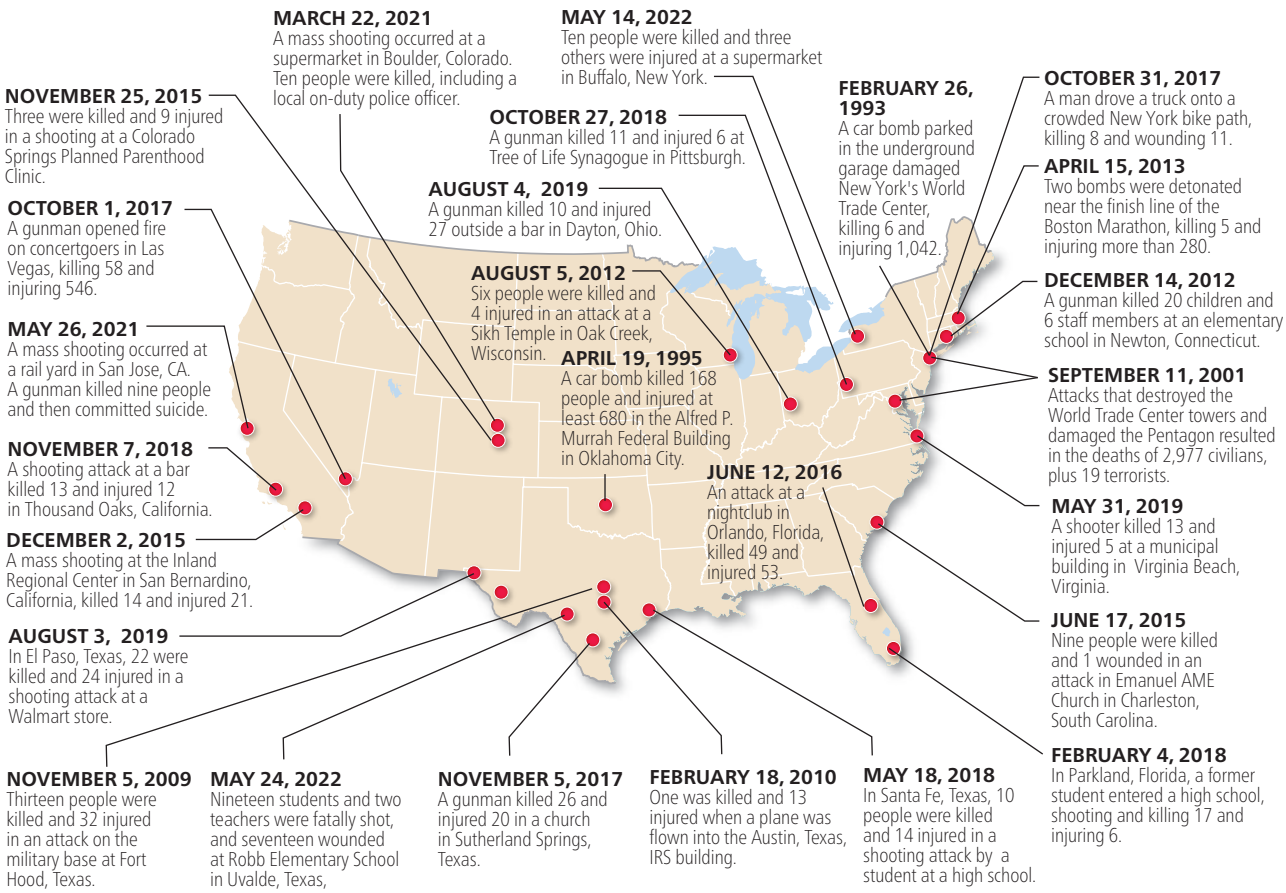
(a) (b)



Other Terrorist Attacks Against Americans

Americans have suffered numerous terrorist attacks (Figure 8-54). Other than the 2001 World Trade Center attack, these are the terrorist attacks that have killed the most Americans since 1988:

- **Lockerbie, Scotland, 1988.** A bomb destroyed Pan Am Flight 103 en route from London to New York, killing 243 passengers, 16 crew, and 11 on the ground in the town of Lockerbie. The only person convicted for the attack was Libyan intelligence officer Abdelbaset al-Megrahi. In 2003, Libya's long-time leader Muammar al-Gaddafi renounced terrorism, accepted responsibility for the Lockerbie bombing, and paid compensation to the families of the victims. Brutal attacks on Libyan protestors in 2011 again brought most other states of the world into active opposition to Gaddafi's regime, which was ultimately overthrown. Gaddafi was captured and killed. Since then, Libya has been plunged into a civil war.
- **Oklahoma City, 1995.** A car bomb killed 168 and injured at least 680 in the Alfred P. Murrah Federal Building. Timothy J. McVeigh was convicted and executed for the Oklahoma City bombing. For assisting McVeigh, Terry I. Nichols was convicted of conspiracy and involuntary manslaughter but not executed. McVeigh claimed that his terrorist act was provoked by rage against the U.S. government for such actions as the Federal Bureau of Investigation's 51-day siege of the Branch Davidian religious compound near Waco, Texas. The siege of that compound culminated in gunfire exchange and an engulfing fire on April 19, 1993, which resulted in 80 deaths.
- **Kenya and Tanzania, 1998.** Truck bombs killed 213 in the U.S. embassy in Nairobi, Kenya, and another 11 in the U.S. embassy in Dar es Salaam, Tanzania. The bombings were ordered by al-Qaeda in retaliation for an alleged role played by the United States in capturing four al-Qaeda operatives in Albania. Twenty-one al-Qaeda operatives were indicted; eight each were captured and jailed, two died, and three were never captured.
- **Orlando, 2016.** A gunman killed 49 and injured 58 others in an attack in Pulse, a nightclub in Orlando, Florida. The suspect, Omar Mateen, was a U.S. citizen born in the United States. Mateen was killed at the nightclub, and the FBI was unable to establish a motive for the attack, such as possible links to terrorist organizations or because the nightclub was patronized primarily by the LGBTQ community.



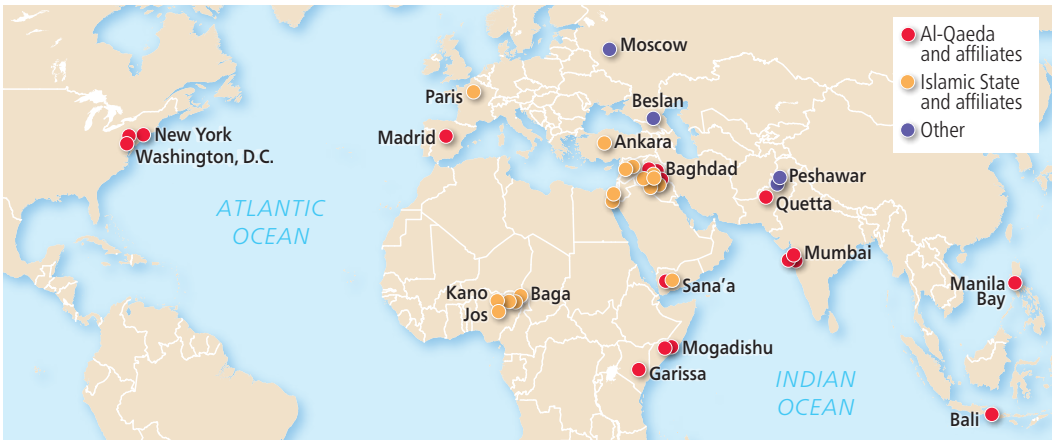
▲ **FIGURE 8-54 TERRORIST ATTACKS IN THE UNITED STATES** The map shows terrorist attacks between 2009 and 2022, each with at least 10 fatalities or injuries, plus three earlier attacks with especially high fatalities.

Source: Center for Systemic Peace

Terrorist Organizations

Learning Outcome 8.4.2
Identify the major terrorist organizations.

Some terrorist incidents, such as the Oklahoma City and Orlando attacks, are the work of one or two individuals who are not formally associated with terrorist organizations. Other attacks are carried out by members belonging to terrorist organizations. The U.S. Department of State has designated 68 Foreign Terrorist Organizations. Another 20 were listed in the past but no longer designated. The four terrorist groups responsible for the most deaths worldwide in 2021 were Islamic State (IS), al-Shabaab, the Taliban, and Jama'at Nusrat al-Islam wal-Muslimin (JNIM) (Figure 8-55).



▲ **FIGURE 8-55 TERRORIST ATTACKS AROUND THE WORLD WITH AT LEAST 100 FATALITIES, 2000–2021**
Source: Institute for Economics and Peace

Al-Qaeda

Responsible for the 2001 World Trade Center attack was Al-Qaeda (an Arabic word meaning "the foundation," or "the base"). The terrorist organization was founded around 1988 by Osama bin Laden to unite several groups of fighters in Afghanistan as well as his supporters elsewhere in Southwest Asia. Osama's father, Mohammed bin Laden, a native of Yemen, established a construction company in Saudi Arabia and became a billionaire through close connections to the royal family. Osama bin Laden, one of about 50 children fathered by Mohammed with many wives, used his several-hundred-million-dollar inheritance to fund al-Qaeda.

Bin Laden moved to Afghanistan during the mid-1980s to support a fight against the Soviet Union, which had sent troops into Afghanistan in 1979 to support that country's pro-Soviet government. Calling the fight against the Soviet Union a holy war, or jihad, bin Laden recruited militant Muslims from Arab countries to join the cause. After the Soviet Union withdrew from Afghanistan in 1989, bin Laden returned to Saudi Arabia, but he was expelled in 1991 for opposing the Saudi government's decision permitting the United States to station troops there during the 1991 war against Iraq. Bin Laden moved to Sudan but was expelled in 1994 for instigating attacks against U.S. troops in Yemen and Somalia, so he returned to Afghanistan, where he lived as a "guest" of the Taliban-controlled government.

Bin Laden issued a declaration of war against the United States in 1996 because of U.S. support for Saudi Arabia and Israel. In a 1998 fatwa ("religious decree"), bin Laden argued that Muslims have a duty to wage a holy war against U.S. citizens because the United States was responsible for protecting the State of Israel and for maintaining the Saud royal family as rulers of Saudi Arabia. He claimed that destruction of the Saudi monarchy and the Jewish state would liberate from their control Islam's three holiest sites of Makkah (Mecca), Madinah, and Jerusalem.

Al-Qaeda's most deadly attacks since 9/11 were in Iraq, especially between 2007 and 2011. Its most notorious terrorist attack in the past decade was a 2015 attack at the Paris offices of the French satirical newspaper *Charlie Hebdo*. Two members of an al-Qaeda branch based in Yemen killed 11 people in the office and 6 more elsewhere in Paris and injured 22. The attackers were protesting cartoons depicting Muhammad in the newspaper, a practice considered taboo in Islam. Several cartoonists were among the victims.

U.S. forces tracked down and killed bin Laden in 2011 (Figure 8-56). In 2022, a U.S.-launched drone killed his successor Ayman al-Zawahri, who was second in command when al-Qaeda attacked the World Trade Center and took over the leadership of al-Qaeda after bin Laden's death.

Al-Qaeda is not a single unified organization, especially since the deaths of its two leaders bin Laden and al-Zawahri. Instead of a centralized organization, al-Qaeda adapted a decentralized structure with loosely associated so-called franchises that are ideologically aligned with al-Qaeda's goals but not financially tied to it.

Pause & Reflect 8.4.2 Translated into English "je suis Charlie" means "I am Charlie." Why might people in Paris have carried signs saying this after the *Charlie Hebdo* terrorist attacks?

▼ **FIGURE 8-56 BIN LADEN BUNKER, ABBOTTABAD, PAKISTAN**
Bin Laden was killed in his bunker by a U.S. military special operations unit, May 2, 2011.

Other Terrorist Groups

Other prominent terrorist groups are active. These include Islamic State, Nusrat al-Islam, and the Taliban.

Islamic State. The Islamic State is a terrorist organization that originated in 1999 and became an affiliate of al-Qaeda in 2004. The two organizations split apart in 2014 because of lack of agreement on how to cooperate and consult with each other. The Islamic State is also known as the Islamic State of Iraq and Syria (ISIS) and the Islamic State of Iraq and the Levant (ISIL). The Islamic State calls itself a *state* because over the years, it has controlled considerable territory in northern Iraq and eastern Syria. However, it is not recognized anywhere in the world as a sovereign state.

Members of the Islamic State are Sunni Muslims who seek to impose strict religious laws. They have maintained control of territory through human rights violations, such as beheadings, massacres, and torture.

Nusrat al-Islam. Jama'at Nusrat al-Islam wal-Muslimin is another terrorist organization that formed from al-Qaeda. It operates primarily in West Africa, especially Mali. In 2021, members of the group attacked a camp of U.N. peacekeepers in northern Mali.

Taliban. When the Taliban (which means "religious students") gained power in Afghanistan in 1996, many Afghans welcomed them as preferable to the corrupt and brutal warlords who had been running the country. U.S. and other Western officials also welcomed them as strong defenders against the Soviet Union, which had invaded Afghanistan in 1979 and was forced to withdraw in 1989.

Once in control of Afghanistan's government in the 1990s, the Taliban imposed laws inspired by fundamentalist Islamic values as the Taliban interpreted them (Figure 8-57). Soccer stadiums were converted to settings for executions and floggings. Men were beaten for shaving their beards and women stoned for committing adultery. Gay men were buried alive and prostitutes were hanged in front of large audiences.

A U.S.-led coalition overthrew the Taliban in 2001 and replaced it with a democratically elected government. However, the Taliban was able to regroup and regained control of Afghanistan in 2021 (see Chapter 7).

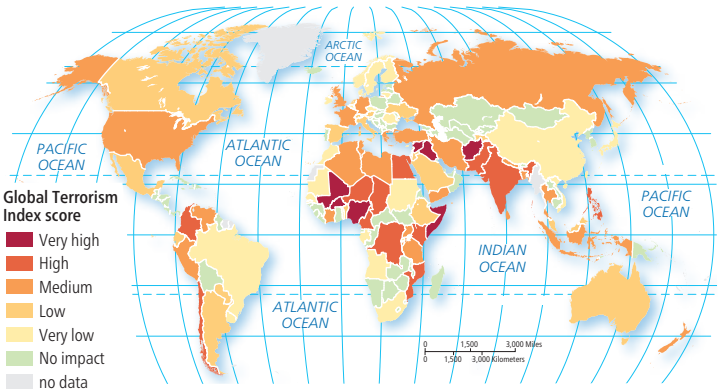
The Institute for Economics & Peace (IEP) constructs an annual Global Terrorism Index made up of four indicators: the number of terrorism incidents, the number of fatalities, the extent of injuries, and the amount of property damage. In 2022, the areas with the highest terrorism index were in Southwest Asia and sub-Saharan Africa (Figure 8-58).

According to the IEP, the number of deaths from terrorism increased from 5,000 in 2000 to 32,000 in 2014 before declining to around 7,000 since 2018 (Figure 8-59). Most of the recent terrorist incidents and fatalities have occurred in Iraq, Afghanistan, and sub-Saharan Africa.

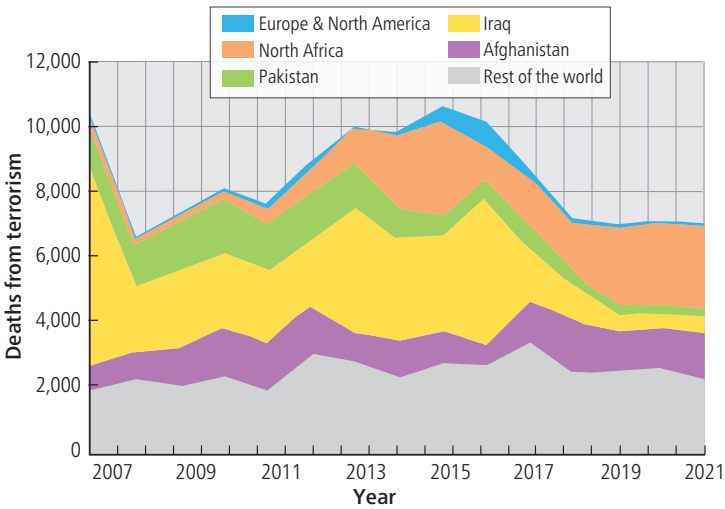
The U.S. Department of State designates countries as State Sponsors of Terrorism if they repeatedly provide support for acts of international terrorism. Currently designated are North Korea, Cuba, Iran, and Syria. Countries formerly on the list are Iraq, Libya, South Yemen, and Sudan.

(a) (b)

▲ **FIGURE 8-57 TALIBAN DESTRUCTION** (a) A 1999 image of a 53-meter (175-foot) statue of Buddha in Bamiyan, Afghanistan; (b) a Taliban soldier stands next to the empty niche after the Taliban destroyed the statue in 2002. The statue was destroyed because the Taliban claimed it violated Islamic principles.



▲ **FIGURE 8-58 GLOBAL TERRORISM INDEX**
Source: Institute for Economics & Peace



▲ **FIGURE 8-59 DEATHS FROM TERRORISM**
Source: Institute for Economics & Peace

Weapons of Mass Destruction

Learning Outcome 8.4.3 Describe the distribution of nuclear weapons.

A **weapon of mass destruction** is a nuclear, biological, chemical, or other weapon that can kill and bring significant harm to a large number of humans or cause great damage to human-made structures, natural structures, or the biosphere. However, no treaty or international law contains an authoritative definition. The term was initially applied to nuclear weapons, but in recent years, it has been expanded to encompass biological and chemical attacks as well.

Nuclear Weapons

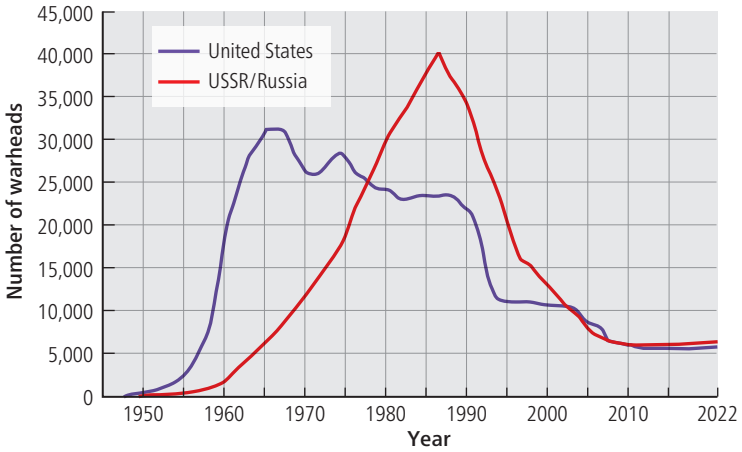
The United States collaborated with Canada and the United Kingdom to develop nuclear weapons during World War II. The Allies feared that scientists in Nazi Germany were also trying to develop nuclear weapons. The Allies dropped atomic bombs on Hiroshima and Nagasaki, Japan, in August 1945. Around 105,000 died immediately from the effects of the two blasts as well as from heat and radiation, and an unknown number died later from radiation sickness and related cancers. The attack brought an end to World War II. No government has dared to use these bombs in a war since then because leaders recognize that a full-scale nuclear conflict could terminate human civilization.

During the Cold War, the Soviet Union also developed nuclear weapons. Altogether, eight countries have successfully detonated nuclear weapons, in this chronological order: United States (1945), Soviet Union (1949), United Kingdom (1952), France (1960), China (1964), India (1974), Pakistan (1998), and North Korea (2006). Israel is suspected of possessing nuclear weapons but has not admitted to it and is not known with certainty to have conducted a nuclear test. In 2022, these nine countries had a total of 12,705 nuclear warheads, according to the Federation of American Scientists (Table 8-1).

The Treaty on the Non-Proliferation of Nuclear Weapons, which went into force in 1970, has been signed by 191 countries. The treaty was designed to prevent the spread of nuclear weapons and nuclear weapons technology and to promote the peaceful use of nuclear energy. The treaty designated five countries as nuclear-weapon states: United States, Soviet Union (now Russia), United Kingdom, France, and China. The other 186 signatories agreed never to acquire nuclear weapons. In exchange, the five nuclear-weapon states agreed to share their nuclear technology for peaceful purposes and to pursue the ultimate elimination of all nuclear arsenals.

Since the treaty went into effect, the number of warheads possessed by the United States and Russia has declined sharply (Figure 8-60). The United States had more than 30,000 warheads during the 1960s, and Russia had more than 40,000 during the 1980s. The two countries have agreed through treaties to destroy a large percentage of their warheads, though they have retained roughly the same number and together have 90 percent of the world's total. Four states that once possessed nuclear weapons agreed to dismantle their arsenals as part of the treaty: South Africa and the former Soviet republics of Belarus, Kazakhstan, and Ukraine.

Four countries – India, Israel, Pakistan, and South Sudan – never signed the treaty, and a fifth country – North Korea – withdrew in 2003. India and Pakistan last tested nuclear weapons in 1998, leaving North Korea as the only country to test nuclear weapons in the twenty-first century (Figure 8-61).



▲ **FIGURE 8-60 CHANGING NUMBER OF NUCLEAR WARHEADS**
Source: Federation of American Scientists

TABLE 8-1 | Nuclear Warheads, 2022

Country	Nuclear Warheads
Russia	5,977
United States	5,428
France	290
China	350
United Kingdom	225
Pakistan	165
India	160
Israel	90
North Korea	20
Total	12,705

▼ **FIGURE 8-61 NORTH KOREA NUCLEAR TEST** South Koreans watch North Korea launch a missile capable of carrying a nuclear warhead.

Suspect States

A number of states that signed the Nuclear Non-Proliferation Treaty have been suspected of pursuing development of weapons of mass destruction, including nuclear and chemical weapons. Countries of particular concern to the United States have been clustered in Southwest Asia & North Africa.

Iran. Hostility between the United States and Iran dates from 1979, when a revolution forced abdication of Iran's pro-U.S. Shah Mohammad Reza Pahlavi. Iran's majority Shiite supporters of exiled fundamentalist Shiite Muslim leader Ayatollah Ruholiah Khomeini then proclaimed Iran an Islamic Republic. Militant supporters of the ayatollah seized the U.S. embassy on November 4, 1979, and held 52 Americans hostage until January 20, 1981.

The United States and most other countries have opposed Iran's aggressive development of a nuclear program (Figures 8-62 and 8-63). Iran claimed that its nuclear program was for civilian purposes, but observers concluded that it was intended to develop weapons. Prolonged negotiations produced an agreement to degrade Iran's nuclear capabilities without resorting to yet another war in the region. President Trump pulled the United States out of the treaty in 2018, claiming that the treaty did not do enough to prevent Iran from continuing to pursue nuclear weapons. However, other signatories have continued to support the treaty.

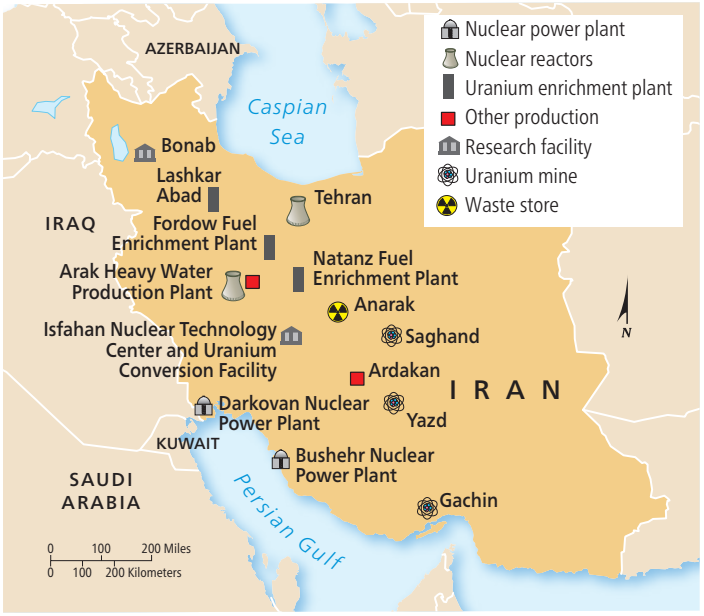
Iraq. Saddam Hussein (1937–2006, president 1979–2003) employed chemical weapons against Kurds and Iranians during the 1980s. After Iraq invaded Kuwait in 1991, Operation Desert Storm, led by the United States, successfully drove Iraq out of Kuwait. The United Nations located and destroyed Iraq's chemical weapons stockpile.

The United States led a second attack against Iraq in 2003 in order to depose Saddam Hussein. The United States asserted that Iraq still possessed weapons of mass destruction and had close links with terrorist organizations. However, most other countries, as well as ultimately U.S. intelligence agencies, did not agree. The United States then argued instead that Hussein's quarter-century record of brutality justified replacing him with a democratically elected government. Once Hussein was deposed, Iraq was plunged into a long-running civil war, especially between Shiites and Sunnis as well as the Kurds and the terrorist organization Islamic State. Hussein was tried for crimes against humanity, convicted, and sentenced to death.

Libya. Libya's long-time leader Muammar al-Gaddafi (1942–2011, ruler 1969–2011) bought nuclear technology blueprints from Pakistan and tried to enrich imported uranium into weapons-grade material. Libya gave up its nuclear program in 2003 and cooperated with international inspectors. In 1988, Libyan agents were responsible for blowing up Pan Am flight 103 over Lockerbie, Scotland, killing 270 people in the plane and on the ground.

Syria. The Syrian government under the leadership of its longtime President Bashar al-Assad has repeatedly employed chemical weapons in its long-running multisided civil war. The United States, Russia, and other countries have failed to get Syria to eliminate its stockpile.

Pause & Reflect 8.4.3 For what purpose is a nuclear power plant typically used? Why must the nuclear power plants of some countries that signed the nonproliferation treaty be monitored by international inspectors?



▲ **FIGURE 8-62 IRAN'S NUCLEAR FACILITIES**

▲ **FIGURE 8-63 NUCLEAR PRODUCTION** Iran's nuclear capabilities are explained to Iran's President Hassan Rouhani (second from right).

Challenges in Defining States

Learning Outcome 8.4.4 Explain why it is difficult to determine whether some of Earth's land areas are sovereign states.

A state has sovereignty, which was defined earlier in the chapter as independence from control of its internal affairs by other states. There is some disagreement about the actual number of sovereign states. This disagreement is closely tied to the history and geography of the places involved and most often involves neighboring states. Among places that test the definition of sovereignty are Korea, Western Sahara (Sahrawi Republic), and China.

▲ **FIGURE 8-64 NORTH AND SOUTH KOREA** A nighttime satellite image recorded by the U.S. Air Force Defense Meteorological Satellite Program shows the illumination of electric lights in South Korea.

Korea: One State or Two?

The Korean peninsula is divided between the Democratic People's Republic of Korea (North) and the Republic of Korea (South). After the United States and the former Soviet Union defeated Japan in World War II, the victors divided Korea, which had been a colony of Japan for 35 years, into two occupation zones. The Soviet Union installed a pro-Communist government in the North, while a pro-U.S. government was established in the South.

North Korea invaded the South in 1950, sparking a three-year war that ended in a cease-fire. Both governments are committed to reuniting the country into one sovereign state. However, both maintain that they are the one that should exercise sovereignty over the entire Korean peninsula.

North Korea is one of the world's poorest and most isolated countries, and since 1948, it has been governed as a dictatorship by Kim Il-sung, his son Kim Jong-il, and his grandson Kim Jong-un. Further aggravating reconciliation, North Korea has built and tested nuclear weapons and long-range missiles, even though the country lacks the ability to provide its citizens with food, electricity, and other basic needs (Figure 8-64). Public support in South Korea for reunification is declining as younger generations have no memories of a unified country and lack direct family connections to Koreans in the North.

Sahrawi Republic/Western Sahara: Who Is Sovereign?

The Sahrawi Arab Democratic Republic, also known as Western Sahara, is considered by most African countries as a sovereign state. Morocco, however, claims the territory and to prove it has built a 2,700-kilometer (1,700-mile) wall around the territory to keep out rebels (Figure 8-65).

Spain controlled the territory on the continent's west coast between Morocco and Mauritania until withdrawing in 1976. An independent Sahrawi Republic was declared by the Polisario Front and recognized by most African countries, but Morocco and Mauritania annexed the northern and southern portions, respectively. Three years later Mauritania withdrew, and Morocco claimed the entire territory. At first, other states did not recognize Morocco's claim to the entire territory, but an increasing number of states now do recognize the claim. Morocco controls most of the populated area, but the Polisario Front still operates in the vast, sparsely inhabited deserts, especially the one-fifth of the territory that lies east of Morocco's wall (Figure 8-66).

▼ **FIGURE 8-65 DIVISION OF SAHRAWI REPUBLIC/WESTERN SAHARA** Morocco controls the western portion of the territory and the Polisario Front controls the eastern portion.

▼ **FIGURE 8-66 SAHRAWI REPUBLIC/WESTERN SAHARA SAND WALL** Morocco soldiers patrol a 2,700-kilometer (1,700-mile) wall made of sand built by Morocco to isolate Polisario Front rebels fighting for an independent Sahrawi Republic.

China & Taiwan: One State or Two?

Most other countries consider China (officially the People's Republic of China) and Taiwan (officially the Republic of China) as separate and sovereign states. According to China's government, Taiwan is not sovereign but a part of China.

The current status arises from a civil war in China during the late 1940s between the Nationalists and the Communists. After losing in 1949, Nationalist leaders fled to Taiwan, 200 kilometers (125 miles) off the Chinese coast, and proclaimed that they were still the legitimate rulers of the entire country of China. Until some future occasion when they could defeat the Communists and recapture all of China, the Nationalists argued, at least they could continue to govern one island of the country.

The United States had supported the Nationalists during the civil war, so many Americans opposed acknowledging that China was firmly under the control of the Communists. Consequently, the United States continued to regard the Nationalists as the official government of China until the 1970s, when U.S. policy finally changed, and the United Nations voted to transfer China's seat from the Nationalists to the Communists.

More than 70 years after the China civil war, most Taiwanese now regard Taiwan as a distinct nationality from China. In a recent study by the Pew Research Center, only 4 percent of people in Taiwan identified their nationality as Chinese, compared with 66 percent who identified as Taiwanese and the remainder as both Taiwanese and Chinese. Nonetheless, the People's Republic of China continues to maintain its claim that Taiwan is part of China.

Senkaku/Diaoyu Islands: Conflicting Claims

The People's Republic of China, Taiwan, and Japan all claim sovereignty over several small uninhabited islands in the East China Sea. These islands are known as Diaoyu in China, Diaoyutai in Taiwan, and Senkaku in Japan (Figure 8-67). The largest of five islands is only 4.32 square kilometers (1.7 square miles) (Figure 8-68). The collection also includes three rock outcroppings, the smallest of which is only 800 square meters (8,600 square feet).

Japan has controlled the islands since 1895, except between 1945 and 1972, when the United States administered them after defeating Japan in World War II. China and Taiwan claim that the islands historically belonged to China until the Japanese government illegally seized them in 1895. Japan's position is that China did not state that it had sovereignty over the uninhabited islands back in 1895, when Japan claimed them. To bolster their claims, China, Japan, and Taiwan have established air defense identification zones in the East China Sea with conflicting boundaries. An **air defense identification zone** is air space that a country unilaterally declares its right to identify, locate, and control civil aircraft in the interest of national security.

Pause & Reflect 8.4.4 Other than military action, how might the sovereignty of these disputed territories be settled?

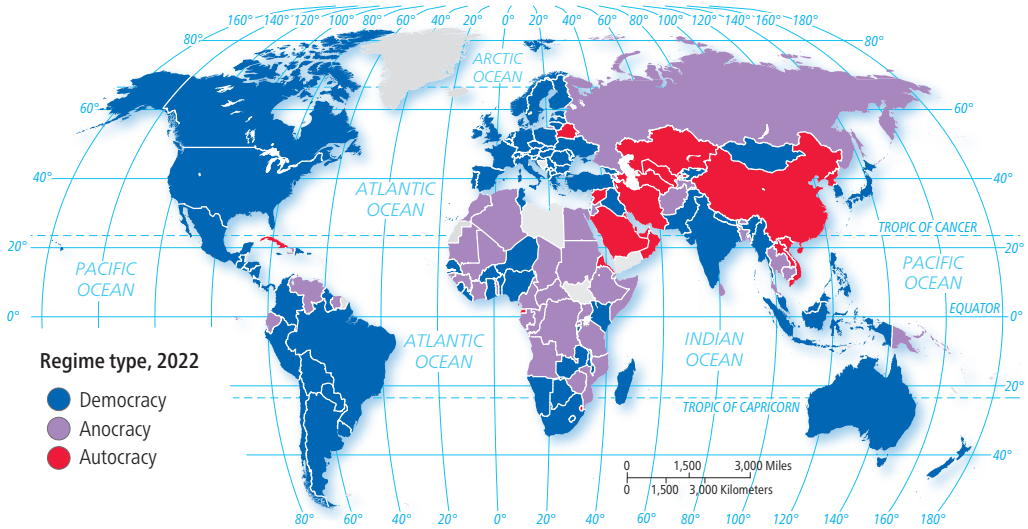
▲ **FIGURE 8-67 DISPUTED ISLANDS** The Senkaku/Diaoyu islands are all claimed by China, Taiwan, and Japan. The three countries have conflicting air defense identification zones.

▲ **FIGURE 8-68 SENKAKU/DIAOYU ISLANDS**

Challenges to Democracy

Learning Outcome 8.4.5
Describe types of governance and resulting confrontation among states.

The Cold War era (late 1940s until the early 1990s) was a period of competition and tension between the United States and the Soviet Union and their respective allies. Recent events have revived some elements of the Cold War rivalry.



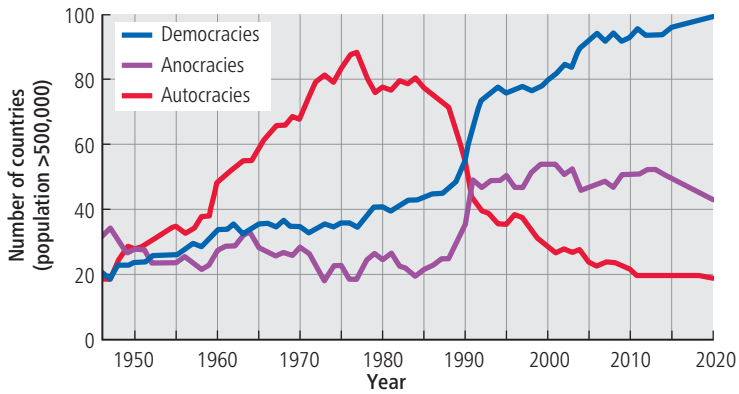
▲ **FIGURE 8-69 REGIME TYPES** Most states are classified as democratic, autocratic, or anocratic.
Source: Center for Systemic Peace

National Scale: Regime Types

Some national governments are better able than others to provide the leadership needed to promote peace and prosperity. In contrast, a corrupt repressive government embroiled in wars is less able to respond effectively to economic challenges. National governments can be classified as democratic, autocratic, or anocratic (Figure 8-69).

- A **democracy** is a country in which citizens elect leaders and can run for office.
- An **autocracy** is a country that is run according to the interests of the ruler rather than the people.
- An **anocracy** is a country that is not fully democratic or fully autocratic but rather displays a mix of the two types.

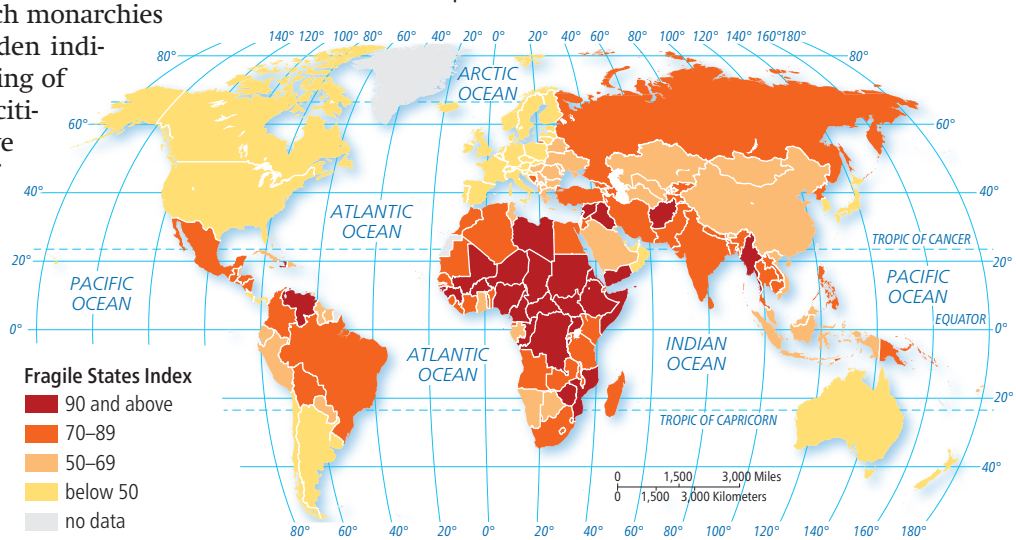
The world has become more democratic since the 1970s, according to the Center for Systemic Peace (Figure 8-70). The center cites these reasons for the trend: the replacement of increasingly irrelevant and out-of-touch monarchies with elected governments that broaden individual rights and liberties, the widening of participation in policymaking to all citizens through rights to vote and to serve in government, and the diffusion of democratic government structures created in Europe and North America to other regions.



▲ **FIGURE 8-70 TREND TOWARD DEMOCRACY** The number of autocracies has declined sharply since the 1980s. The most rapid increase in democracies came after the breakup of Communist states in Europe.

State Fragility

The Fragile States Index, calculated by the Fund for Peace, measures the relative stability of every country. The index combines several factors, including fairness of the legal system, extent of youth unemployment, level of violence, and freedom to express diverse political views (Figure 8-71).



▲ **FIGURE 8-71 FRAGILE STATES INDEX**

The most fragile states are clustered in sub-Saharan Africa. This is not surprising, as we have already seen the region to have the world's highest population growth and poorest health (Chapter 2), the greatest extent of ethnic cleansing and genocide (Chapter 7), and the most problematic shapes of states (discussed previously in this chapter). The region also has the largest number of recent civil wars.

Pause & Reflect 8.4.5 What region of the world appears to have the greatest concentration of autocratic regimes?

The Cold War

The Cold War era was characterized by the presence of two superpowers: the United States and the Soviet Union. As very large states, both superpowers could quickly deploy armed forces in different regions of the world. To maintain strength in regions that were not contiguous to their own territory, the United States and the Soviet Union established military bases in other countries. From these bases, ground and air support were in proximity to local areas of conflict. Naval fleets patrolled the major bodies of water.

Both superpowers repeatedly demonstrated that they would use military force if necessary to prevent an ally from becoming too independent. The Soviet Union sent its armies into Hungary in 1956 and Czechoslovakia in 1968 to install more sympathetic governments. Because those states were clearly within the orbit of the Soviet Union, the United States chose not to intervene militarily.

Before the Cold War, the world typically contained more than two superpowers. For example, before the outbreak of World War I in the early twentieth century, there were eight great powers: Austria, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States. When a large number of states ranked as great powers of approximately equal strength, no single state could dominate. Instead, major powers joined together to form temporary alliances. A condition of roughly equal strength between opposing alliances known as a **balance of power**.

During the Cold War, the balance of power became bipolar between the United States and the Soviet Union. Because the power of these two states was so much greater than the power of all other states, the world comprised two camps. Other states were relegated to a new role of either ally or satellite.

With the breakup of the Soviet Union, Russia found itself less powerful than during the Cold War. Many of the newly independent states once part of the Soviet Union were no longer allied with Russia, and pro-democracy governments replaced Communist governments in other Eastern European countries. Russia's President Vladimir Putin attacked Ukraine in part as an attempt to regain the position of strength held by the Soviet Union during the Cold War.

Meanwhile, China has emerged as a global superpower, through the central role it plays in the world's economy (see Chapter 11), as well as its military strength, including possession of a nuclear arsenal. China's emergence as a superpower has emboldened its claims of sovereignty over Taiwan and islands in the East China Sea.

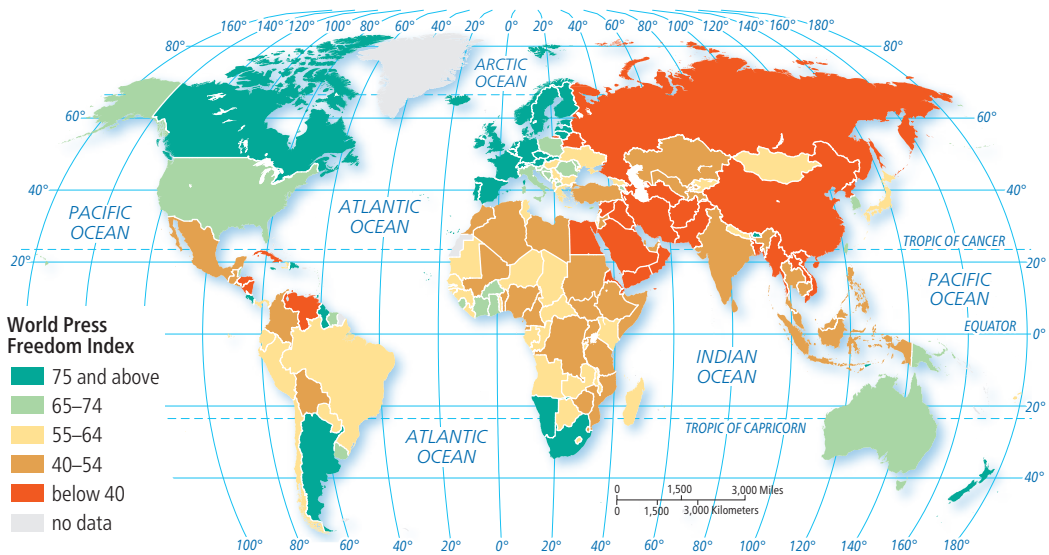
Freedom of the Press

Reporters Without Borders, an international nonprofit organization founded by journalists, assesses the ability of journalists to produce and disseminate news and information independently from political, economic, legal, and social interference, without threat to their safety.

The organization constructs a Press Freedom Index that combines five indicators. The political environment indicator evaluates the degree of political support and respect for independent media. The economic environment indicator evaluates economic constraints linked to governmental policies by advertisers and media owners. The legal environment indicator evaluates protection for journalists. The social environment indicator evaluates barriers to a free press emanating from social constraints. The security environment indicator evaluates the ability to gather and disseminate news without unnecessary risk of harm.

Reporters Without Borders is especially critical of the lack of press freedom in authoritarian countries such as China and Russia. Freely accessing and reporting on information is considered criminal activity in repressive regimes. China's government is said to conduct a campaign of repression against journalism. Since Russia invaded Ukraine in 2022, Russia's government banned almost all independent media.

Democracies in northern Europe, receive the highest marks from Reporters Without Borders (Figure 8-72). However, the organization is concerned with threats to a free and independent press in some democracies as a result of the spread of fake news.



▲ **FIGURE 8-72 PRESS FREEDOM INDEX**

Europe's Fragile Cooperation

Learning Outcome 8.4.6 Describe the principal alliances in Europe.

During the Cold War that followed World War II, two military alliances and two economic alliances formed in Europe. In the twenty-first century, one of the military alliances and one of the economic alliances continues, whereas the other two have been disbanded.

Europe's Economic Alliances

During the Cold War, two economic alliances formed in Europe. The European Union (EU, formerly known as the European Economic Community, the Common Market, and the European Community) formed in 1958 with 6 member states. The EU was designed to heal scars from World War II (which had ended only 13 years earlier). The Council for Mutual Economic Assistance (COMECON) formed in 1949 with 6 member states; 10 countries ultimately joined. COMECON was designed to promote trade and sharing of natural resources in Communist Eastern Europe. COMECON disbanded in 1991.

The European Union in the Twenty-First Century

With the end of the Cold War, economic cooperation throughout Europe has become increasingly important. The EU expanded from its original 6 countries to 12 during the 1980s, 28 during the first decade of the twenty-first century, and 27 after the United Kingdom withdrew in 2019 (Figure 8-73). The most recent additions have been former members of COMECON. Several states have applied to join the EU, including Ukraine.

The main task of the European Union is to promote development within the member states through economic and political cooperation. A European Parliament is elected by the people in each of the member states simultaneously. Subsidies are provided to farmers and to economically depressed regions. Most goods move across borders of member states in trucks and trains without stopping. With a few exceptions, a citizen of one EU member state is permitted to work in other states. A bank or retailer can open branches in any member country with supervision only by the corporation's home country (Figure 8-74).

Many Europeans do not feel connected to the institutions that govern the EU or to the officials working in EU offices. Opposition to EU policies, especially free movement of citizens among EU member countries, induced a majority of United Kingdom voters in 2016 to support the country's withdrawal from the EU in 2019, a move known as "Brexit."

The Eurozone

The most dramatic step taken toward integrating Europe's nation-states into a regional organization was the creation of the eurozone. A single bank, the European Central Bank, was given responsibility for setting interest rates and minimizing inflation throughout the eurozone.

Most importantly, a common currency, the euro, was created for electronic transactions beginning in 1999 and in notes and coins beginning in 2002. France's franc, Germany's mark, and Italy's lira – powerful symbols of sovereign nation-states – have disappeared. Twenty-five countries use the euro, including 19 EU members.

European leaders bet that every country in the region would be stronger economically if it replaced its national currency with the euro. For the first few years that was the case, but the future of the euro has been called into question by economic and political turmoil in Europe. The economically weaker countries within the eurozone, such as Greece and Italy, have been forced to implement harsh and unpopular policies, such as drastically cutting services and raising taxes, whereas the economically strong countries, especially Germany, have been forced to subsidize the weaker states.

▲ **FIGURE 8-73 THE EUROPEAN UNION**

Pause & Reflect 8.4.6 What might be the benefits and disadvantages for the European Union to let in new member states—from the point of view of both the EU and of the prospective members?

▼ **FIGURE 8-74 TOURIST BOAT IN FRONT OF EUROPEAN PARLIAMENT BUILDINGS, STRASBOURG, FRANCE**

Europe's Military Alliances

After World War II, most European states joined one of two military alliances:

- **North Atlantic Treaty Organization (NATO).** A military alliance, originally among 16 democratic states in Europe plus the United States and Canada.
- **The Warsaw Pact.** A military agreement among Communist Eastern European countries. The Warsaw Pact disbanded in 1991 following the end of communism in Eastern Europe.

NATO and the Warsaw Pact were designed to maintain a bipolar balance of power in Europe. For NATO allies, the principal objective was to prevent the Soviet Union from overrunning West Germany and other smaller countries. The Warsaw Pact provided the Soviet Union with a buffer of allied states between it and Germany to discourage a third German invasion of the Soviet Union in the twentieth century. Some of Hungary's leaders in 1956 asked for the help of Warsaw Pact troops to crush an uprising that threatened communist control of the government. Warsaw Pact troops also invaded Czechoslovakia in 1968 to depose a government committed to reforms.

When Germany was divided into East Germany and West Germany in 1949, the city of Berlin was also divided. To prevent its citizens from crossing over into the West, East Germany built a wall in 1961. After reunification of Germany in 1990, gates were opened, and most of the wall was demolished. However, portions remain as a reminder of the Cold War past (Figure 8-75).

In a Europe no longer dominated by military confrontation between two blocs, the Warsaw Pact was disbanded, and the number of troops under NATO command was sharply reduced. However, Russia's forcible takeover of portions of Ukraine in 2014 and 2022 heightened fears of renewed confrontation and resumption of the Cold War. Russia's President Vladimir Putin ordered the war against Ukraine in an attempt to restore the balance of power that existed in Europe prior to the dismantling of the Warsaw Pact and the conversion of autocracy and anocracy governments in Eastern Europe to democracy. NATO expanded its membership to 30 states by adding the former Warsaw Pact countries except for Russia as well as several states formerly republics within the Soviet Union (Figure 8-76). Membership in NATO has offered Eastern European countries a sense of security against a Russian threat as well as participation in a common united Europe. Russia's invasion of Ukraine in 2022 reinforced the role of NATO in protecting countries bordering Russia. The invasion induced previously neutral Finland and Sweden to join NATO, bringing the organization's membership to 32 states.

▲ **FIGURE 8-76 NATO MEMBERS IN EUROPE** Canada and the United States are also members.

▼ **FIGURE 8-75 BERLIN WALL**

8 Summary & Review

KEY ISSUE

8.1 | Where Are States Distributed?

- The world is divided into approximately 200 sovereign states that vary considerably in size.
- All but a handful of states are members of the United Nations.

KEY ISSUE

8.2 | Why Are States Challenging to Create?

- Much of Earth's surface was once organized into city-states, empires, and kingdoms but is now organized into nation-states.
- Much of Earth's land area once comprised colonies, but only a few colonies remain.

KEY ISSUE

8.3 | Why Do States Have Distinctive Geographic Structure?

- Boundaries can be drawn using cultural, physical, or geometric features.
- Five shapes of states are compact, elongated, prorupted, perforated, and fragmented.

KEY ISSUE

8.4 | Why Do States Face Threats?

- Terrorism by individuals and organizations has included the 9/11 attacks on the United States.
- The governance of states can be classified as democratic, anocratic, or autocratic; democracies have been increasing.

Thinking Geographically

KEY ISSUE

8.1 | Where Are States Distributed?

Russia invaded Ukraine and annexed portions of it. Nearly every other country in the world refuses to recognize Russia's sovereignty over portions of Ukraine. Should Russian-occupied territory appear on maps as part of Ukraine or as part of Russia? Why?

▲ **FIGURE 8CR-1 BRIDGE BUILT BY RUSSIA TO CONNECT IT WITH CRIMEA**

KEY ISSUE

8.2 | Why Are States Challenging to Create?

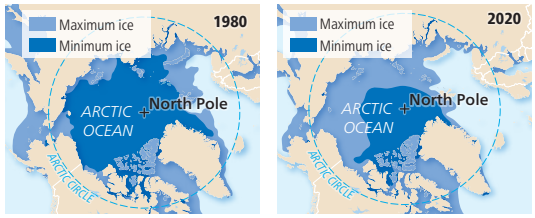
Puerto Rico is a Commonwealth of the United States. Puerto Ricans are U.S. citizens but don't vote in U.S. elections or have a voting member of Congress. What might be the advantages and challenges of Puerto Rico becoming a U.S. state or becoming an independent country?

▲ **FIGURE 8CR-2 CAPITOL OFFICE BUILDING, SAN JUAN, PUERTO RICO**

KEY ISSUE

8.3 | Why Do States Have Distinctive Geographic Structure?

The Arctic Ocean sea ice has receded in recent decades as a result of climate change. How might the reduction in sea ice affect claims by states to the Arctic region? How might states benefit or be harmed by the loss of the sea ice?

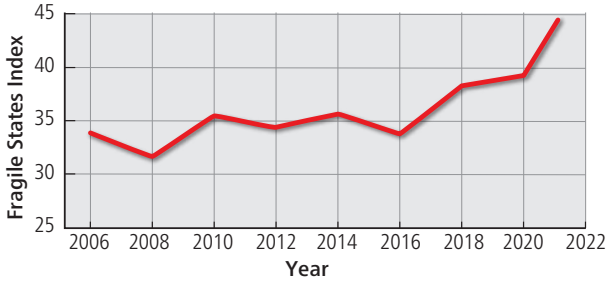


▲ **FIGURE 8CR-3 RECEDING ARCTIC SEA ICE**

KEY ISSUE

8.4 | Why Do States Face Threats?

The Fragile States Index for the United States was much worse in 2021 than in 2016. The index is based on four factors: fairness of the legal system, extent of youth unemployment, level of violence, and freedom to express diverse political views. What factors might have contributed to the worsening of the U.S. Fragile States Index?



▲ **FIGURE 8CR-4 FRAGILE STATES INDEX FOR THE UNITED STATES** A lower number is a better score.

Key Terms

Air defense identification zone Air space across which a country unilaterally declares its right to identify, locate, and control civil aircraft in the interest of national security.
Anocracy A country that is not fully democratic or fully autocratic but rather displays a mix of the two types.
Antecedent boundary A physical feature that serves as a boundary, so named because it existed before the present settlement.
Autocracy A country that is run according to the interests of the ruler rather than the people.
Balance of power A condition of roughly equal strength between opposing countries or alliances of countries.
Boundary An invisible line that marks the extent of a state's territory.
City-state A sovereign state comprising a city and its immediately surrounding countryside.
Colonialism An attempt by one country to establish settlements and to impose its political, economic, and cultural principles in another territory.
Colony A territory that is legally tied to a sovereign state rather than completely independent.
Compact district A local government district in which the residents live as near to one another as possible and the distance from the center to any boundary varies as little as possible.
Compact state A state in which the distance from the center to any boundary does not vary significantly.
Consequent boundary A boundary drawn in order to separate groups based on ethnic, linguistic, religious, or economic differences.
Cultural boundary A boundary that follows the distribution of cultural features, such as ethnicity, religion, and language.
Democracy A country in which citizens elect leaders and can run for office.
Elongated state A state with a long, narrow shape.
Federal state An internal organization of a state that allocates most powers to units of local government.
Fragmented state A state that includes several discontinuous pieces of territory.
Frontier A zone separating two states in which neither state exercises political control.
Geometric boundary A boundary based on a human construct such a as a straight line or a parallel of latitude.
Gerrymandering The process of redrawing legislative boundaries for the purpose of benefiting the party in power.
Landlocked state A state that does not have a direct outlet to the sea.
Microstate A state that encompasses a very small land area.
Multinational state A state that contains two or more cultural groups with traditions of self-determination that agree to coexist peacefully.
Nation A large group of people who are united by common cultural characteristics, such as language and ethnicity, or by shared history.
Nation-state A state whose territory corresponds to that occupied by a particular nation.
Perforated state A state that completely surrounds another one.
Physical boundary A boundary that follows a significant feature of the natural landscape, such as a mountain range and river.
Prorupted state An otherwise compact state with a large projecting extension.
Relic boundary A boundary that no longer functions but can still be detected on the cultural landscape.
Self-determination The concept that ethnicities have the right to govern themselves.
Sovereignty Ability of a state to govern its territory free from control of its internal affairs by other states.
State An area organized into a political unit and ruled by an established government that has control over its internal and foreign affairs.
Subsequent boundary A boundary that is established after the settlement of an area and is changed to reflect developments such as war.
Superimposed boundary A boundary drawn on an area by a conquering or colonizing power that ignores existing cultural patterns.
Terrorism The threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation.
Unitary state An internal organization of a state that places most power in the hands of central government officials.
Weapon of mass destruction A nuclear, biological, chemical, or other weapon that can kill and bring significant harm to a large number of humans or cause great damage to human-made structures, natural structures, or the biosphere.

International Geographic Mapping Explorations

Disputed Territory in the East China Sea

Japan, China, and Taiwan have several disputes over sovereignty in the East China Sea, in addition to the Senkaku/Diaoyu Islands. One example is Pengjia Islet, a small island 75 kilometers (40 miles) north of Taiwan. Pengjia is claimed by China and Taiwan.

FIGURE 8CR-5 TAIWAN COAST GUARD NEAR PENGJIA ISLET

. . . . Geographers observe that political conflicts can occur where the distribution of cultural groups differ from the boundaries of states. Increasingly, though, competition and cooperation among cultural groups and countries arise because of distinctive distributions of levels of economic development, as we see in the next chapter, Development. . . .

9 Development

KEY ISSUES

9.1 Why Does Development Vary Among Countries?

The United Nations divides countries according to their level of development. The U.N. Human Development Index is the basis for the allocation.

9.2 Where Are Inequalities in Development Distributed?

According to U.N. development measures, the status of women is lower than that of men in every country. Within countries, the level of development also varies by place of residence.

9.3 Why Do Countries Face Development Challenges?

Self-sufficiency and international trade are two paths to development. International trade has become more important, although countries have had increasing concerns with that path.

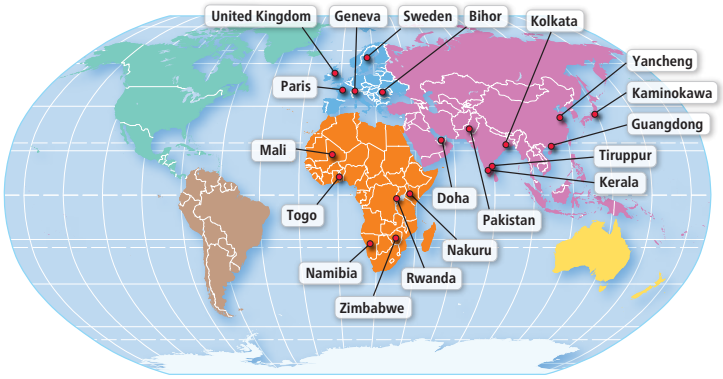
9.4 Why Are Countries Able to Make Progress in Development?

By most measures, the level of development worldwide has improved. The U.N. has adopted goals that emphasize sustainable development.

▶ Turning rubble into construction material, La Paz, Bolivia.

Development is considered a process of improving people's prospects of leading long and healthy lives, acquiring knowledge, and obtaining adequate resources. The average person in the world is better off today than in the twentieth century. People generally possess more wealth, have had more education, and will live longer than someone in the previous century. But not everyone is better off.

LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

9.1 | Why Does Development Vary Among Countries?

Earth's nearly 200 countries can be classified according to their level of development. The development process is continuous, involving never-ending actions to constantly improve the health and prosperity of people.

Development & Geography

Learning Outcome 9.1.1 Explain the concepts of development, developed and developing countries, and the Human Development Index.

Development is the process of improving the conditions of people through diffusion of knowledge and technology. The U.N. defines development as a process of enlarging people's ability to lead a long and healthy life, to acquire knowledge, and to have access to resources needed for a decent standard of living. With access to these three elements, people have greater opportunities to be creative and productive and to enjoy personal self-respect and guaranteed human rights.

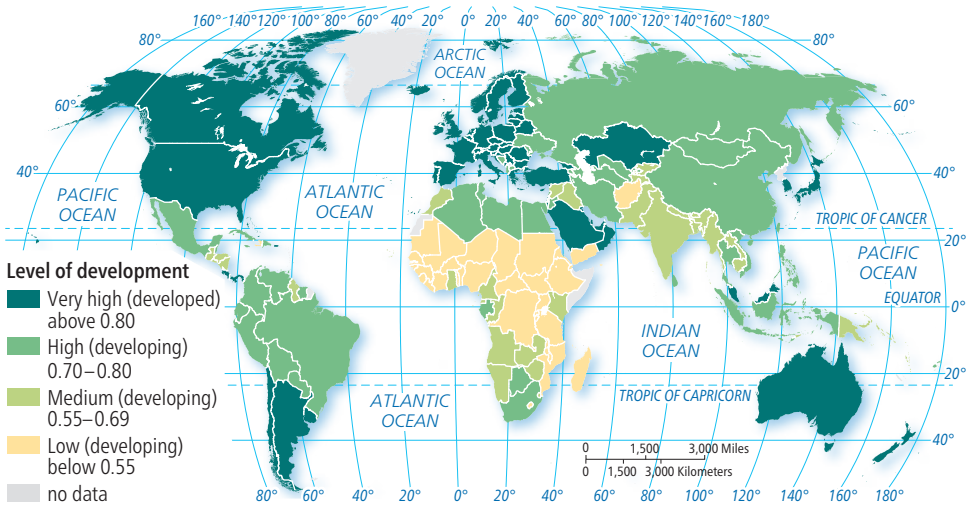
Every place lies at some point along a continuum of development. Because many countries cluster at the high and low ends of the continuum of development, they can be divided into two groups:

- A **developed country**, also known as a more developed country (MDC) and referred to by the U.N. as a very high developed country, has progressed further along the development continuum.
- A **developing country**, also frequently called a less developed country (LDC), has made some progress toward development, though less than the developed countries. Recognizing that progress has varied widely among developing countries, the U.N. divides them into high, medium, and low developing (Figure 9-1).

Human Development Index

To determine the level of development of every country, the U.N. created the **Human Development Index (HDI)**. The HDI measures the level of development for a country through a combination of three factors: a decent standard of living, a long and healthy life, and access to knowledge. Each country gets an overall HDI score based on combining the three factors. The highest HDI possible is 1.0, or 100 percent (Figure 9-2). The U.N. has computed HDIs for countries every year since 1980, although it has occasionally modified the method of computation.

▲ **FIGURE 9-1 DEVELOPED AND DEVELOPING COUNTRIES** Tourists from the United States, a developed country, meet children in Namibia, a developing country.



▲ **FIGURE 9-2 HUMAN DEVELOPMENT INDEX (HDI)** Developed countries are those with very high HDI scores. The other three classes are for developing countries.
Source: United Nations

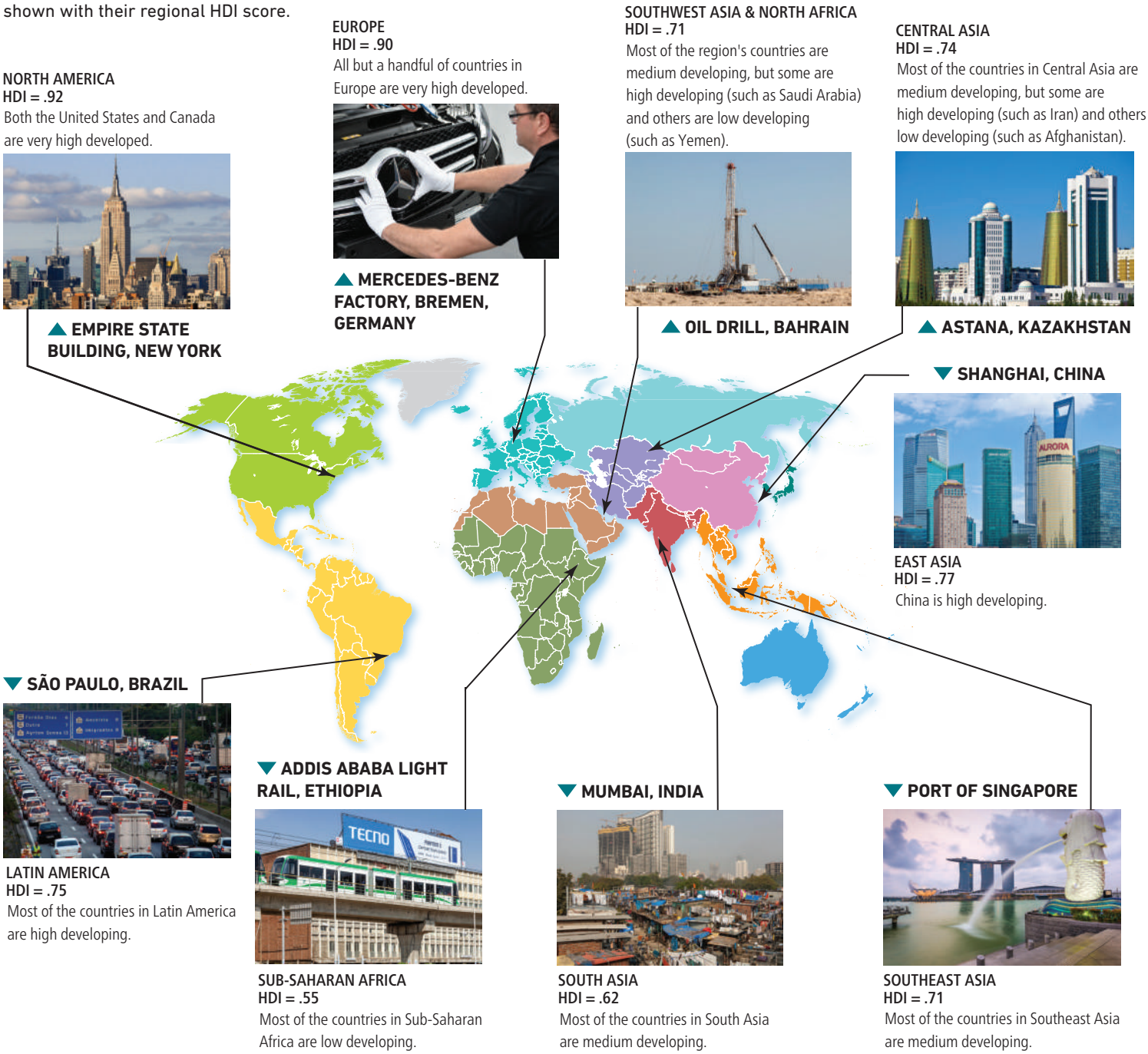
Development Regions

Geographers refer to the HDI scores to divide the world into two developed regions and seven developing regions (Figure 9-3). North America and Europe are the two developed regions. The seven developing regions are Latin America, East Asia, South Asia, Southeast Asia, Central Asia, Southwest Asia & North Africa, and sub-Saharan Africa. Each region has an overall HDI score, shown in Figure 9-3. Sub-Saharan Africa is the region with the lowest HDI score. As we will see in this chapter, regions sometimes have unexpectedly high or low scores in particular factors.

In addition to the nine regions, three other distinctive areas can be identified. Japan and South Korea are classified separately rather than included with the rest of East Asia because their level of development is much higher than that of their neighbors. The South Pacific is a much less populous area than the nine development regions; Australia (its most populous country) and New Zealand are developed, but the area's other countries are developing. Russia has an HDI score that places it on the boundary between very high developed and high developing. Adverse impacts on Russia's economy following its invasion of Ukraine in 2022 is expected to result in Russia's classification as high developing rather than developed.

Pause & Reflect 9.1.1 Which developing regions appear to have relatively high diversity in the HDIs of individual countries?

▼ FIGURE 9-3 DEVELOPMENT REGIONS The nine world regions are shown with their regional HDI score.



A Decent Standard of Living

Learning Outcome 9.1.2 Explain the HDI standard of living factor.

Having enough wealth for a decent standard of living is key to development. The average individual in a developed country earns a much higher income than the average individual in a developing one. Geographers observe that people in developed countries generate and spend their wealth in different ways than people in developing countries.

Income

The U.N. measures the standard of living in countries through a complex index called *annual gross national income per capita at purchasing power parity* (Figure 9-4). **Gross national income (GNI)** is the value of the output of goods and services produced in a country in a year, including money that leaves and enters the country. **Purchasing power parity (PPP)** is an adjustment made to the GNI to account for differences among countries in the cost of goods. For example, if a resident of country A has the same income as a resident of country B but must pay more for a Big Mac or a Starbucks latte, the resident of country B is better off.

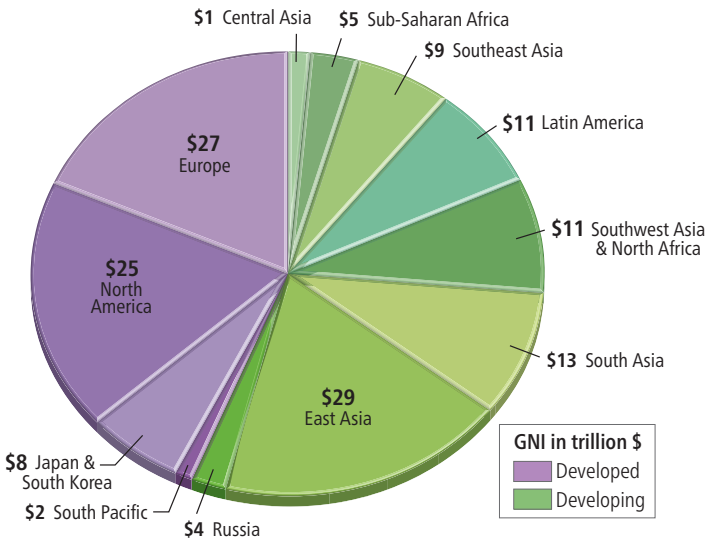
By dividing GNI by total population, it is possible to measure the contribution made by the average individual toward generating a country's wealth in a year. For example, GNI in the United States was approximately $23.4 trillion in 2021, and the population was approximately 332 million, so GNI per capita was approximately $70,480. In 2021, per capita GNI was approximately $51,000 for all developed countries combined compared to approximately $12,000 for all developing countries. Developed countries have around 15 percent of the world's population and 44 percent of the world's GNI (Figure 9-5).

Some studies use other measures of a country's income. **Gross domestic product (GDP)** is the value of the output of goods and services produced in a country in a year, excluding money that leaves and enters the country. **Gross national product (GNP)** is the value of the output of goods and services produced by the residents and businesses of a country in a year regardless of whether the residents and businesses have contributed the output inside the country or abroad.

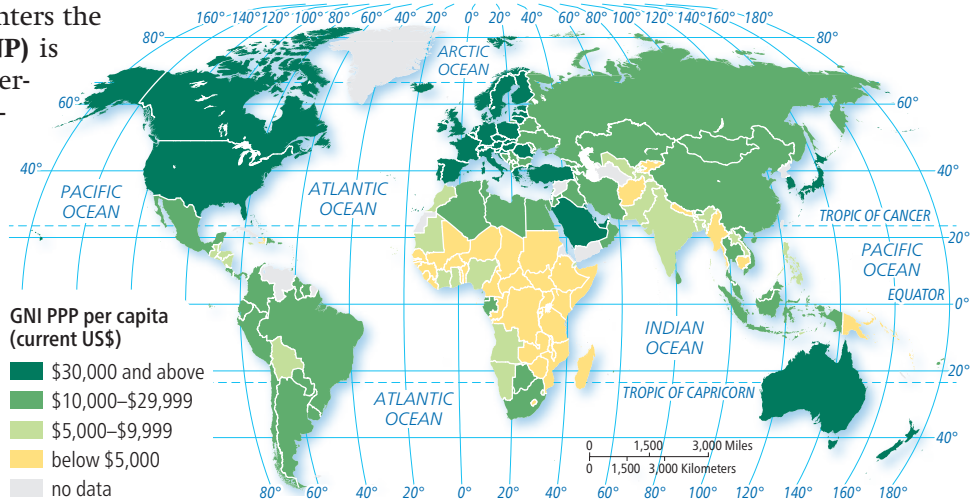
Per capita GNI – or, for that matter, any other single indicator – cannot measure perfectly the level of a country's development. Only a small number of people may be starving in a developing country with per capita GNI of a few thousand dollars. And not everyone is wealthy in a developed country with per capita GNI of $51,000. Per capita GNI measures average (mean) wealth, not the distribution of wealth. If only a few people receive much of the GNI, then the standard of living for the majority may be lower than the average figure implies. Still, the higher the per capita GNI, the greater the potential for ensuring that all citizens can enjoy a comfortable life.

Consumer Goods

Part of the wealth generated in developed countries is used to purchase goods and services. Especially important are goods and services related to transportation and communications, including motor vehicles, telephones, and computers. Motor vehicles provide individuals with access to jobs and services and permit businesses to distribute their products. The number of motor vehicles per 1,000 persons is approximately 217 in the world as a whole, 750 in developed countries, and 135 in developing countries.



▲ **FIGURE 9-5 GNI BY REGION**
Source: Population Reference Bureau



▲ **FIGURE 9-4 GNI PER CAPITA PPP** GNI per capita PPP is highest in developed countries. The lowest figures are in sub-Saharan Africa and portions of Asia.
Source: Population Reference Bureau

Economic Structure

Average per capita income is higher in developed countries because people typically earn their living by different means than in developing countries. Jobs fall into three categories:

- The **primary sector** includes activities that directly extract materials from Earth through agriculture (discussed in Chapter 10) and sometimes by mining, fishing, and forestry.
- The **secondary sector** includes manufacturers that process, transform, and assemble raw materials into useful products as well as industries that fabricate manufactured goods into finished consumer goods (discussed in Chapter 11).
- The **tertiary sector** involves the provision of goods and services to people in exchange for payment, such as retailing, banking, law, education, and government (discussed in Chapters 12 and 13).

Some studies add two more sectors to the above three. The **quaternary sector** comprises information and knowledge-based services, while the **quinary sector** includes human services and hospitality. However, most studies include so-called quaternary and quinary sector services as components of the tertiary sector (see Chapter 12).

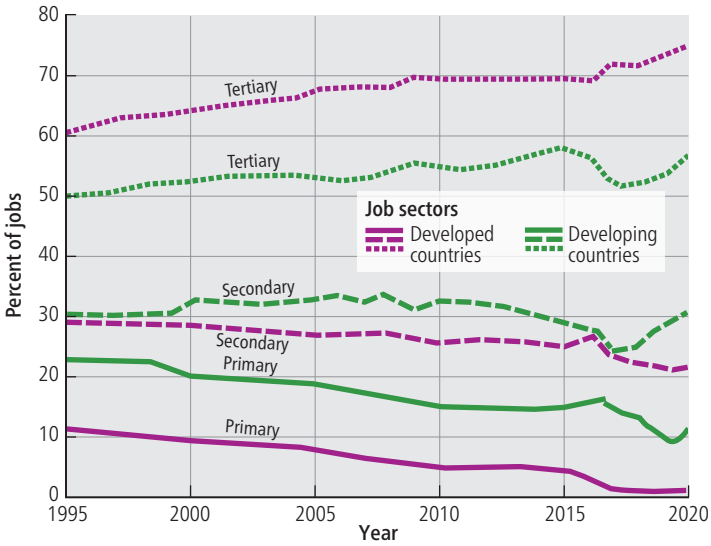
The contribution to GNI among primary, secondary, and tertiary sectors varies between developed and developing countries (Figure 9-6). The share of GNI accounted for by the primary sector has decreased in developing countries, but it remains higher than in developed countries. The low share in developed countries indicates that a handful of farmers produce enough food for the rest of society. The share of GNI accounted for by the secondary sector has decreased in developed countries and is now less than in developing countries. The share of GNI accounted for by the tertiary sector is relatively high in developed countries.

Productivity

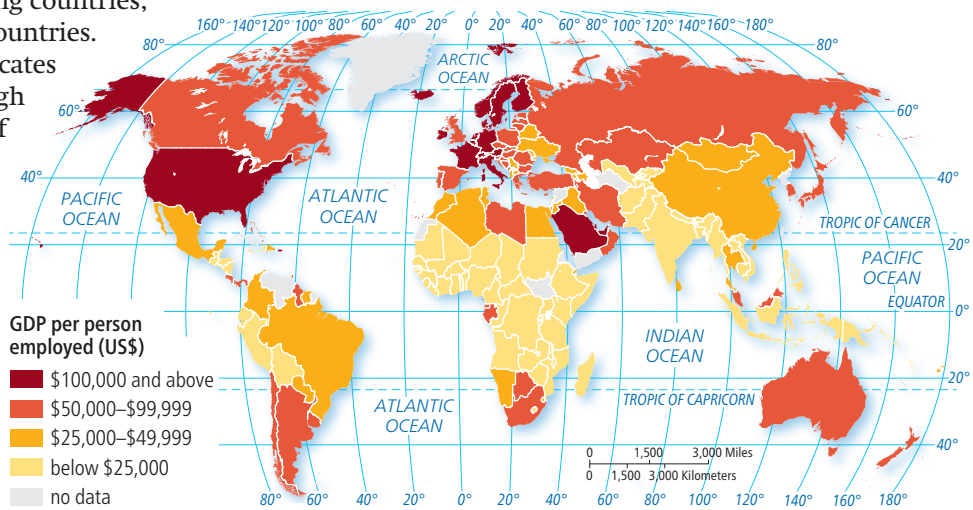
Workers in developed countries are more productive than those in developing countries. **Productivity** is the value of a particular product compared to the amount of labor needed to make it. The World Bank measures a country's productivity by dividing the total GDP by the number of persons employed. GDP per employee exceeds $100,000 in North America and Europe, compared with around $10,000 in sub-Saharan Africa (Figure 9-7).

Workers in developed countries produce more with less effort because they have access to more machines, tools, and equipment to perform much of the work (Figure 9-8). On the other hand, production in developing countries relies more on human and animal power (Figure 9-9). The larger per capita GNI in developed countries in part pays for the manufacture and purchase of machinery, which in turn makes workers more productive and generates more wealth.

Pause & Reflect 9.1.2 Does a country with a high level of productivity typically have a high HDI or low HDI?



▲ **FIGURE 9-6 ECONOMIC STRUCTURE** The graph shows the changing contribution to GNI by the three sectors of jobs.
Source: World Bank



▲ **FIGURE 9-7 PRODUCTIVITY**
Source: World Bank

▼ **FIGURE 9-8 PRODUCTIVITY: DEVELOPED COUNTRY** Robots build much of the Nissan Ariya electric vehicle, Kaminokawa, Japan.

▼ **FIGURE 9-9 PRODUCTIVITY: DEVELOPING COUNTRY** A large labor force assembles toys, Guangdong, China.

Access to Health & Knowledge

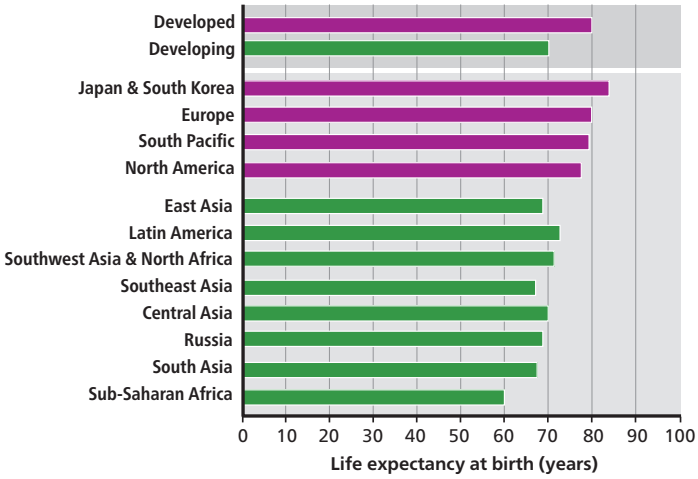
Learning Outcome 9.1.3 Explain the HDI health and education factors.

Development is about more than wealth. The U.N. believes that development is about people becoming healthier and wiser, not just wealthier. A goal of development is to provide the nutrition and medical services needed for people to lead long and healthy lives. Chapter 2 discussed in detail the many differences worldwide in health and medical services.

A Long & Healthy Life

From the many health and medical indicators, the U.N. has selected life expectancy at birth as the contributor to the HDI (Figure 9-10). Life expectancy at birth was defined in Chapter 2 as the average number of years a newborn infant can expect to live at current mortality levels. A baby born in 2022 is expected to live on average to age 72 worldwide, to age 78 in developed countries, and to only age 60 in sub-Saharan Africa (refer to Figure 2-32).

People are healthier in developed countries than in developing countries. When people in developed countries get sick, their countries possess the resources to care for them (Figure 9-11). Developed countries use part of their wealth to protect people who, for various reasons, are unable to work. In these countries, some public assistance is offered to those who are sick, elderly, poor, disabled, orphaned, veterans of wars, widows, unemployed, or single parents. Better health and welfare in developed countries permit people to live longer. With longer life expectancies, developed countries have a higher percentage of older people who have retired and receive public support and a lower percentage of children under age 15 who are too young to work and must also be supported by employed adults. The number of young people is three times higher than the number of older people in developing countries, whereas older people outnumber younger people in developed countries (refer to Chapter 2).



▲ **FIGURE 9-10 LIFE EXPECTANCY AT BIRTH**
Source: Population Reference Bureau

Better health and welfare also permit babies to survive infancy in developed countries. About 95 percent of infants survive and 5 percent die in developing countries, whereas in developed countries more than 99.5 percent survive (refer to Figure 2-21). The infant mortality rate is greater in developing countries for several reasons. Babies may die from malnutrition or lack of medicine needed to survive illness, such as dehydration and diarrhea. They may also die from poor medical practices that arise from lack of education.

(a)

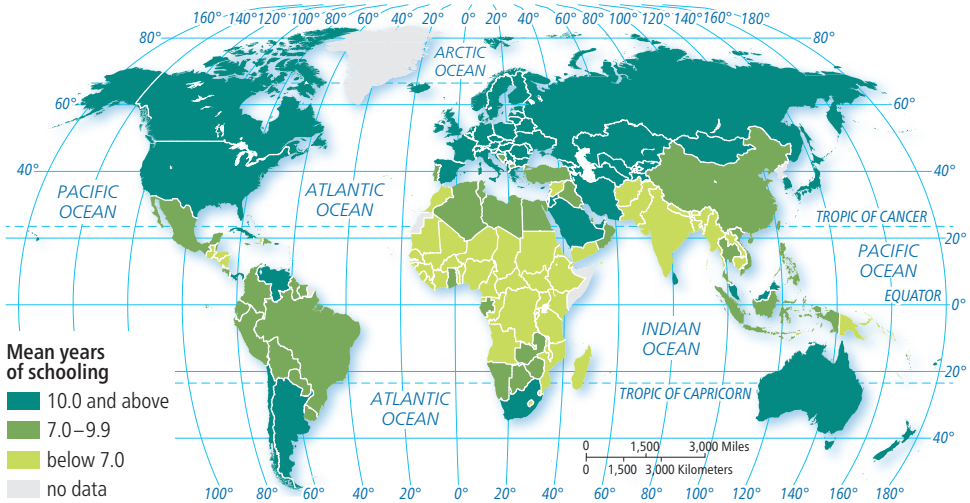
(b)

▲ **FIGURE 9-11 MEDICAL SERVICES** (a) in Sweden, a developed country; (b) in Togo, a developing country.

Access to Education

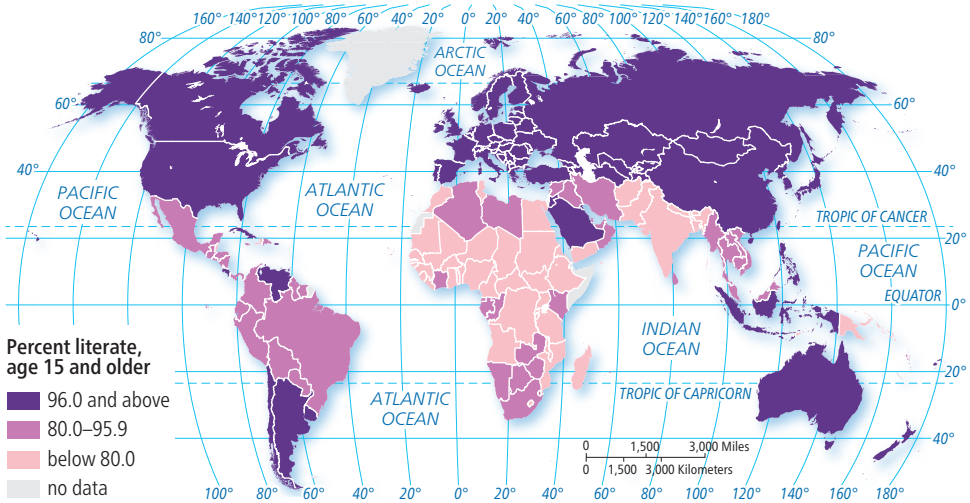
The U.N. considers years of schooling to be the most critical measure of the ability of an individual to gain access to knowledge needed for development. The assumption is that no matter how poor the school, the longer the pupils attend, the more likely they are to learn skills that will help them earn a living. To form the access to knowledge component of HDI, the U.N. combines two measures of years of schooling:

- **Years of schooling for today's adults.** This measures the number of years that the average person aged 25 or older in a country has spent in school (Figure 9-12). Adults have spent an average of 12.3 years in school in developed countries, compared to only 7.5 years in developing countries.
- **Expected years of schooling for today's youth.** This measures the number of years that the U.N. forecasts an average 5-year-old will spend in school. The U.N. expects that 5-year-olds in developed countries will spend an average of 16.5 years in school; in other words, roughly half of today's 5-year-olds will graduate from college in developed countries. On the other hand, the expected average is only 10.3 years in sub-Saharan Africa.



▲ **FIGURE 9-12 MEAN YEARS OF SCHOOLING** The highest number of years of schooling is in North America, and the lowest numbers are in South Asia and sub-Saharan Africa.

Source: United Nations



▲ **FIGURE 9-13 LITERACY RATE** Literacy is nearly 100 percent in developed countries. The lowest rates are in sub-Saharan Africa and South Asia.

Source: United Nations

Other Education Indicators

Other education indicators can measure regional variations in access to knowledge:

- The **literacy rate** is the percentage of a country's people who can read and write (Figure 9-13).
- The **pupil/teacher ratio** is the number of enrolled students divided by the number of teachers. The fewer pupils a teacher has, the more likely that each student receives effective instruction.

Improved education is a major goal of many developing countries, but funds are scarce. Education may receive a higher percentage of GNI in developing countries, but those countries' GNI is far lower to begin with, so they are able to spend far less per pupil than can developed countries (Figure 9-14). Many developing countries are unable to fund free public schools, forcing parents to pay high fees for their children's education.

Adding to the challenge of teaching and learning in developing countries, most print and digital materials are published in developed countries, in part because more of their citizens can read and write and can afford to buy them. Developed countries dominate scientific and nonfiction publishing worldwide. (This text is an example.) Students in developing countries may be required to learn technical information from text that is not in their native language.

▶ **FIGURE 9-14 SPENDING PER PUPIL** Schools in some developing countries, such as Zimbabwe, may have limited funds to spend on educational material, such as electronic access.

Pause & Reflect 9.1.3 The United States has a lower pupil/teacher ratio than Mexico. Does that mean that the pupil/teacher ratio in the United States is more favorable or less favorable than in Mexico?

KEY ISSUE

9.2 | Where Are Inequalities in Development Distributed?

The U.N. believes that every person should have access to decent standards of living, knowledge, and health. In reality, inequality occurs at international, regional, and local levels. It also occurs between males and females.

Unequal & Uneven Development

Learning Outcome 9.2.1 Describe the U.N.'s measures of inequality.

The U.N. has created several indexes to measure the extent of inequality and poverty within countries. In general, inequality is less extreme within developed countries than within developing countries.

Inequality-Adjusted HDI

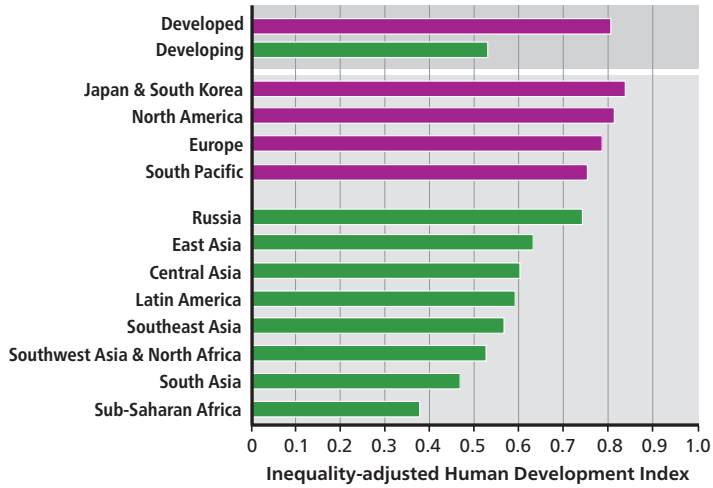
To measure the extent of inequality, the U.N. has created the **Inequality-adjusted Human Development Index (IHDI)**. The IHDI modifies the HDI to account for inequality within a country. Under perfect equality, the HDI and the IHDI are the same.

If the IHDI is lower than the HDI, the country has some inequality; the greater the difference in the two measures, the greater the inequality. For example, a country where only a few people have high incomes, college degrees, and good health care would have a lower IHDI than a country where differences in income, level of education, and access to health care are minimal. The lowest scores (highest inequality) are in sub-Saharan Africa and South Asia (Figure 9-15).

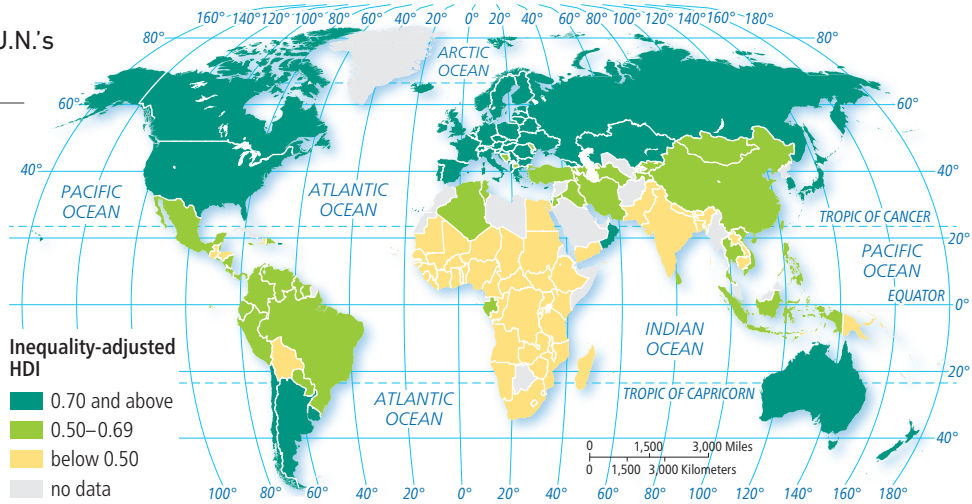
Developed countries have the lowest gap between HDI and IHDI, indicating a modest level of inequality by worldwide standards (Figure 9-16). The U.N. lacks data from several countries in Southwest Asia & North Africa but does estimate an overall IHDI score for the region (refer to Figure 9-15).

Regional Inequality Within Developed Countries

Developed countries may display inequalities among regions. In the United Kingdom, for example, the GDP per capita is twice as high in Central London than in some northern communities (Figure 9-17). Regional inequalities also exist in the United States. The GDP per capita exceeds $90,000 in California, the District of Columbia, Massachusetts, New York, North Dakota, and Washington state and is less than $50,000 in Mississippi.

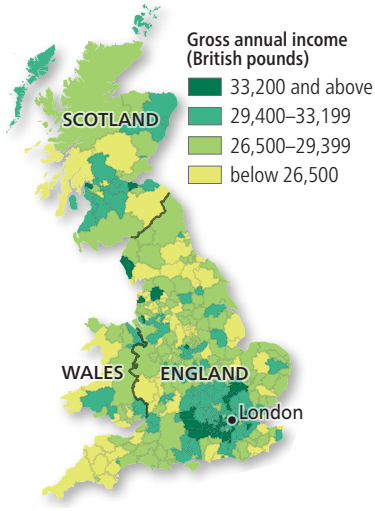


▲ **FIGURE 9-15 IHDI BY REGION** South Asia and sub-Saharan Africa have the lowest scores and therefore the greatest degree of inequality.



▲ **FIGURE 9-16 IHDI BY COUNTRY** The lower the score, the greater the inequality. Europe has the highest score, hence the least inequality. South Asia and sub-Saharan Africa have the lowest scores and therefore the greatest degree of inequality.

Source: United Nations



◀ **FIGURE 9-17 INEQUALITY WITHIN GREAT BRITAIN** Median household income is higher in the south than in the north.

Pause & Reflect 9.2.1
Based on their IHDI scores, how would you expect Mexico and Bolivia to differ from the United States?

Multidimensional Poverty Index

The U.N. conducts detailed studies to document the extent of poverty for the five-sixths of the world's people who live in developing countries. According to the U.N., 20 percent of people in developing countries live in poverty as defined by individual countries. Poverty rates vary from 4 percent in East Asia to 41 percent in sub-Saharan Africa.

The U.N. considers living in poverty to have many dimensions in addition to limited income. The U.N.'s **Multidimensional Poverty Index (MPI)** measures the multiple deprivations in people's lives using the same three dimensions as the HDI (standard of living, health, and education). In addition to income, the MPI index for a developing country's standard of living combines the percentage of people with access to cooking fuel, adequate sanitation, safe drinking water, electricity, and decent housing. Education is a dimension of MPI calculated through a combination of average years of schooling and the percentage of children who attend school. The health dimension combines adequate nutrition and level of child mortality (Figure 9-18).

The overall MPI for developing countries is 0.105 or 10.5 percent, lower than the monetary poverty rate of 20 percent. The percentage varies widely among developing regions – less than 0.10 in Central Asia, East Asia, and Latin America compared with 0.29 in sub-Saharan Africa (Figure 9-19).

The contribution of the three dimensions of standard of living, health, and education to calculating the MPI varies among countries and regions. A low standard of living accounts for around half of the index share in sub-Saharan Africa, whereas poor health contributes around half of the index share in Central Asia. The three dimensions contribute around the same shares in Southwest Asia & North Africa, East Asia, and Latin America (Figure 9-20).

The U.N. concludes that most countries have made progress in reducing MPI. However, the COVID-19 pandemic is estimated to have halted progress in reducing poverty by between 3 and 10 years.

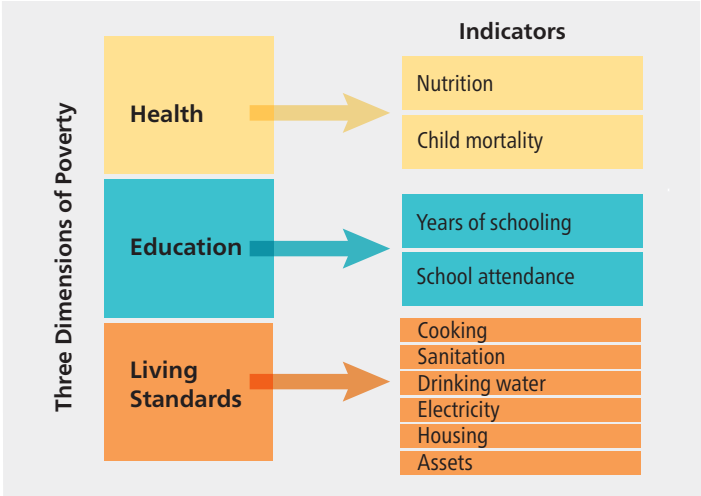


FIGURE 9-18 THREE DIMENSIONS OF POVERTY The U.N. uses several measures of health, education, and living standards to construct the Multidimensional Poverty Index. The score for each of the four health and education indicators contributes 1/6 to the overall MPI, and the score for each of the six standard of living indicators contributes 1/18 to the overall MPI.

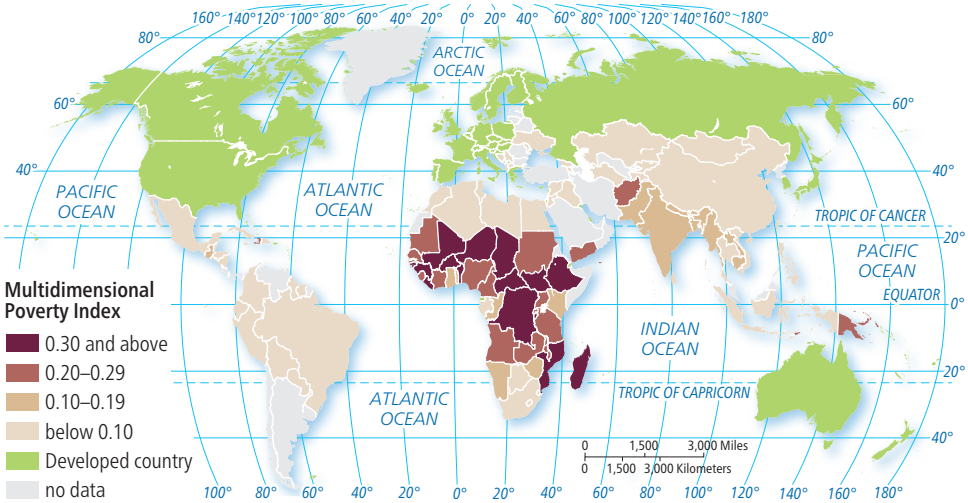


FIGURE 9-19 MULTIDIMENSIONAL POVERTY INDEX BY COUNTRY

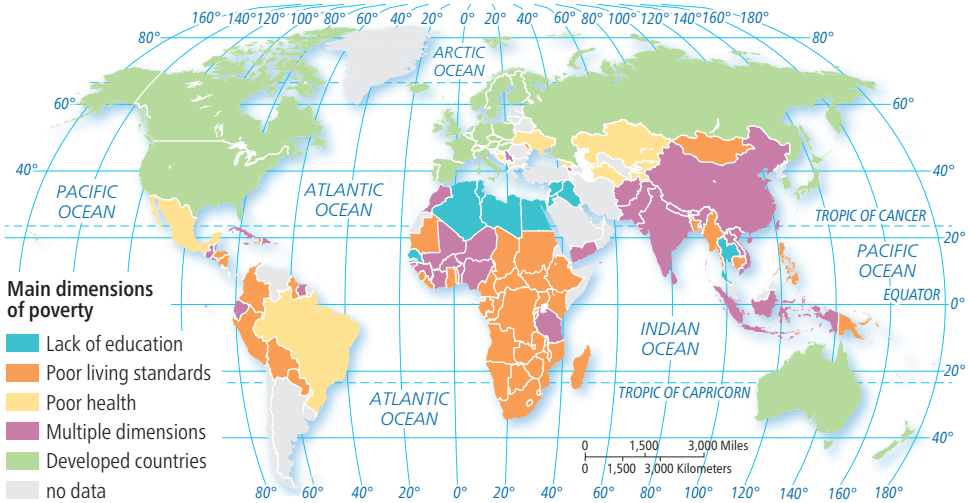


FIGURE 9-20 REGIONAL VARIATIONS IN DIMENSIONS OF MPI

Gender Inequality

Learning Outcome 9.2.2 Describe the U.N.'s measures of gender inequality.

A country's overall level of development can mask inequalities in the status of men and women. The quest for an improved standard of living, access to knowledge, health, and a sustainable future are aspirations of people in all countries. Yet long-standing cultural and legal obstacles can limit women's participation in development and access to its benefits.

The U.N. uses two indexes to measure gender inequality: Gender Development Index (GDI) and Gender Inequality Index (GII). The U.N. has found not a single country in the world where the status of women equals that of men according to the GII and only a handful of countries according to the GDI. At best, women have achieved near-equality with men in some countries, but in other countries, the level of development for women lags far behind the level for men. The U.N. argues that inequality between men and women is a major factor that keeps a country from achieving a higher level of development.

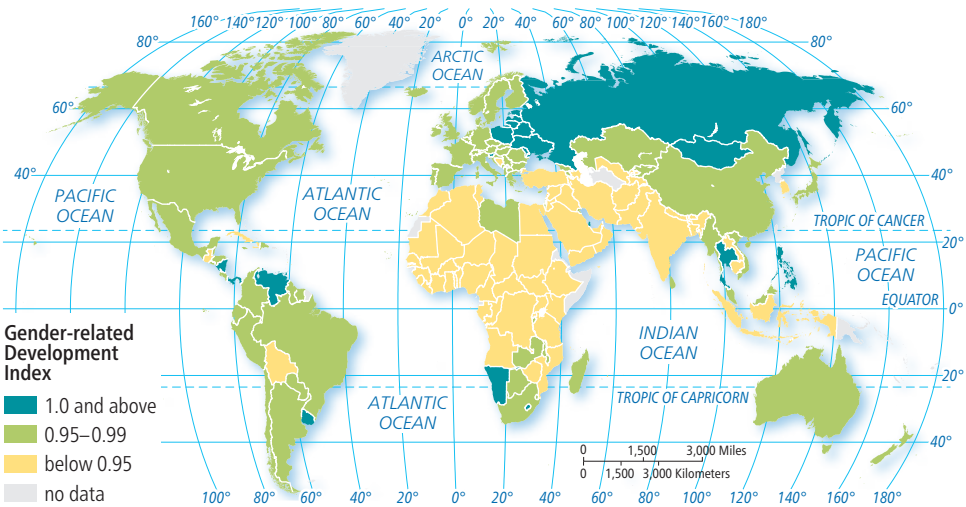
Gender Development Index

The **Gender Development Index (GDI)** measures the gender gap in the level of achievement for the three dimensions of the Human Development Index: income, education, and life expectancy. The GDI uses the same methodology as the HDI, described in the previous section. Countries are ranked based on their deviation from gender parity in the three dimensions of the HDI.

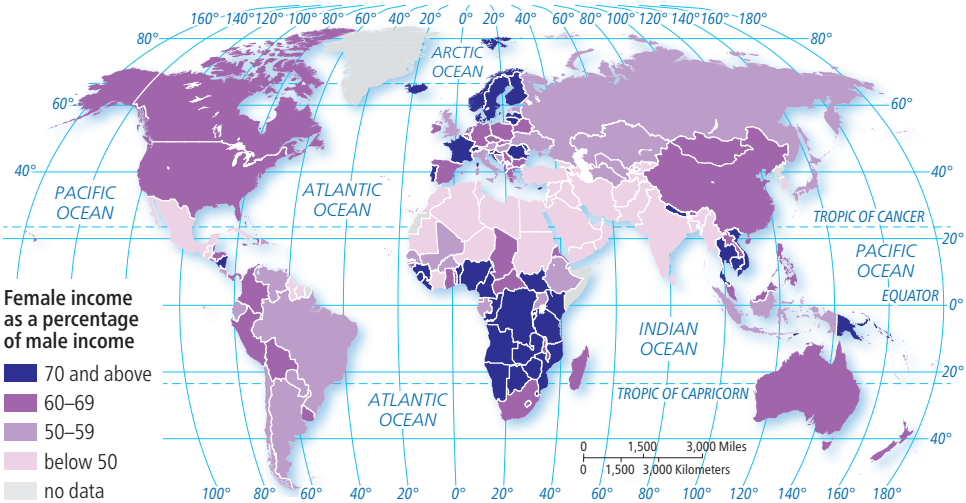
If females and males had precisely the same HDI scores, the GDI would be 1.000. In fact, the overall GDI in the world is .958, which means that the average HDI for all females in the world (.715) is 95.8 percent of the average HDI for all males (.747). The average in developed regions is .986, indicating close to parity, whereas the average in developing countries is .937. The lowest scores are in South Asia and sub-Saharan Africa (Figure 9-21).

The GDI reveals several disparities between females and males:

- **Income disparities.** The U.N. has not found a single country in the world where the average income earned by women exceeds that earned by men (Figure 9-22). Worldwide, the average income of women is 63 percent that of men in developed countries and 50 percent in developing countries.
- **Education disparities.** Worldwide, women completed an average of 8.4 years of schooling, compared with 8.9 years for men. In developed countries, the average education of women and men is virtually the same at around 12 years of schooling, whereas in developing countries women have completed an average of 7.2 years of schooling, compared with 7.9 years for men.
- **Life expectancy disparities.** The life expectancy at birth worldwide is 74 for females and 69 for males. The gap is 6 years in developed countries and 5 years in developing countries.



▲ **FIGURE 9-21 GENDER DEVELOPMENT INDEX**
Source: United Nations



▲ **FIGURE 9-22 FEMALE INCOME AS PERCENT OF MALE INCOME**

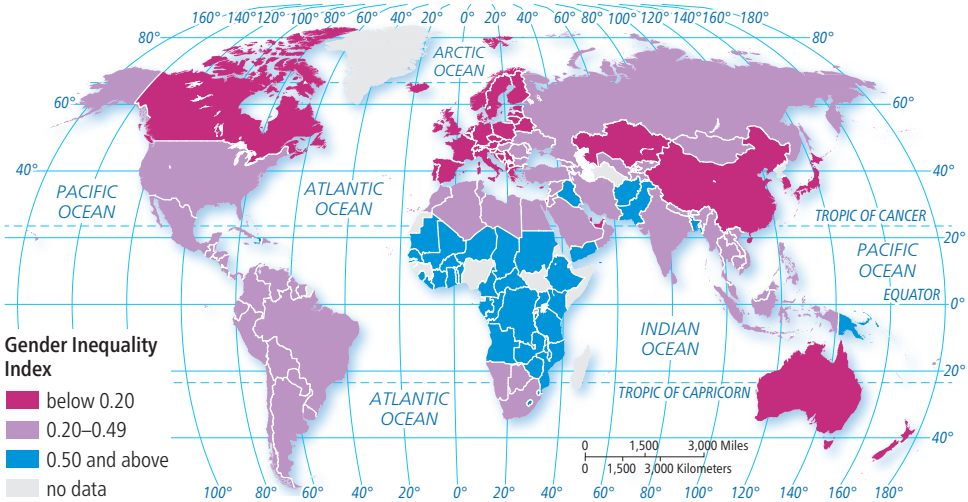
Gender Inequality Index

The **Gender Inequality Index (GII)** measures the gender gap in the level of achievement in three dimensions: reproductive health, empowerment, and the labor market. The higher the GII, the greater the inequality between men and women (Figure 9-23). A score of 0 would mean that men and women fare equally, and a score of 1.0 would mean that women fare as poorly as possible in all measures.

The GII is .487 in developing countries compared with .155 in developed ones. Sub-Saharan Africa, South Asia, and Southwest Asia & North Africa are the developing regions with the highest levels of gender inequality (Figure 9-24). Reproductive health is the largest contributor to gender inequality in these regions. South Asia and Southwest Asia & North Africa also have relatively poor female empowerment scores. At the other extreme, 25 countries, including 19 in Europe as well as Canada, have GIIs less than 0.1, meaning that men and women are nearly equal. In general, countries with high HDIs have low GIIs and vice versa. The U.N. has found that the GII has declined since the 1990s in all but 4 of 138 countries for which data are available.

The United States has a rank in the world of only 42 for GII, compared with a rank of 21 for HDI. The U.N. points to two factors accounting for the relatively low U.S. GII ranking. Compared with other very high HDI countries, the United States has a higher birth rate among teenage women and a higher mortality rate among women during childbirth (Figure 9-25).

Pause & Reflect 9.2.2 The GII is .179 in the United States and .069 in Canada. Which country has greater gender inequality? What factors might be contributing to that greater inequality?



▲ **FIGURE 9-23 GENDER INEQUALITY INDEX** The highest numbers, and therefore the highest inequality, are in sub-Saharan Africa and South Asia. The lowest GII numbers are in Europe.
Source: United Nations

▲ **FIGURE 9-24 GIRLS PUMP WATER FOR THEIR FAMILIES, MALI**

▶ **FIGURE 9-25 TEENAGE MOTHER AND BABY, UNITED STATES**

GII Components

Learning Outcome 9.2.3 Describe the principal components of the GII.

Reproductive Health

The first component of the GII is reproductive health. The effects of reproduction are significantly greater for females by nature. Poor reproductive health is a major contributor to gender inequality in many countries. The reproductive health dimension of the GII is based on two indicators: adolescent fertility rate and maternal mortality rate.

Adolescent Fertility Rate. The **adolescent fertility rate** is the number of births per 1,000 women ages 15 to 19. The adolescent fertility rate is 14 in developed countries and 47 in developing countries. The teenage pregnancy rate is below 10 per 1,000 in most European countries, where most couples use some form of contraception. In sub-Saharan Africa, where gender inequality is high, contraceptive use is below 10 percent, and the teenage pregnancy rate is 101 per 1,000 (Figure 9-26).

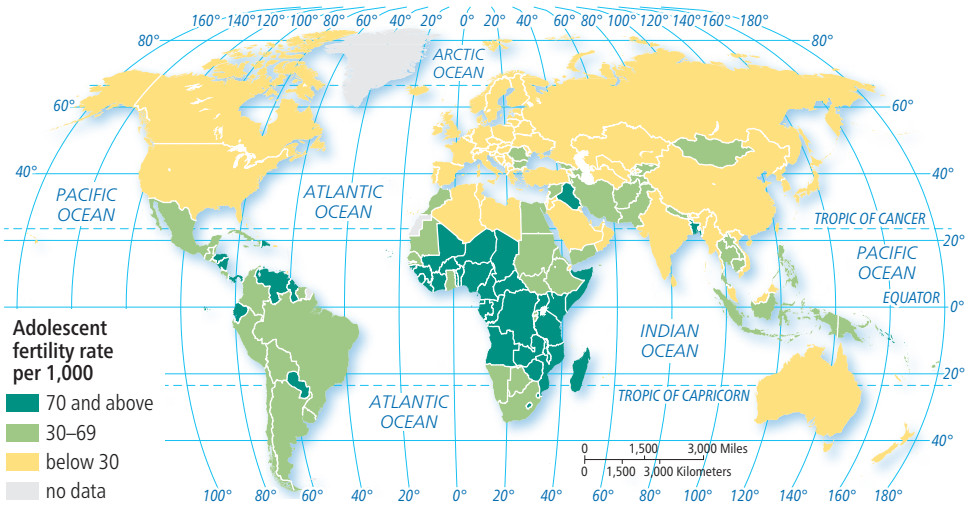
The adolescent fertility rate in the United States (16 per 1,000 in 2022) is twice as high as in most European countries as well as Canada. The rate is especially high for Black Americans and Hispanic Americans. Researchers attribute the high rate of teenage pregnancy in the United States to lack of economic opportunities for many young women, especially Black Americans and Hispanic Americans.

Maternal Mortality Rate. The maternal mortality rate was defined in Chapter 2 as the number of women who die giving birth per 100,000 births. The ratio is 15 deaths of mothers per 100,000 live births in developed countries and 247 in developing countries. The highest rates (most deaths per births) are in sub-Saharan Africa (refer to Figure 2-38). The U.N. estimates that 150,000 women and 1.6 million children die each year between the onset of labor and 48 hours after birth.

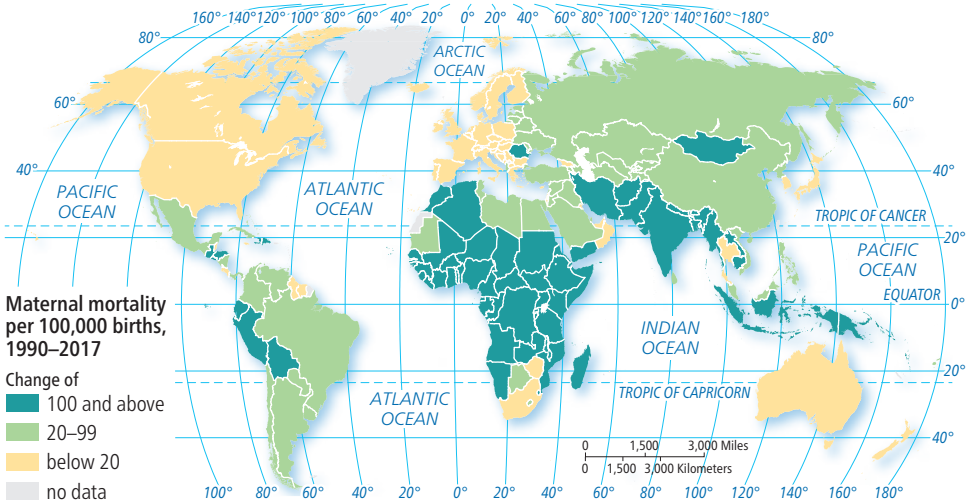
The maternal mortality rate has declined worldwide over the past three decades, from 350 per 100,000 in 1990 to 225 in 2022 (Figure 9-27). Dramatic improvements have been seen in many countries of sub-Saharan Africa and Asia. The United States is one of only around a dozen countries where the rate has increased since 1990.

The maternal mortality rate varies widely among the 50 U.S. states. The rate exceeds 40 in Georgia, Indiana, and Louisiana, and is less than 10 in California, Massachusetts, and Nevada.

Pause & Reflect 9.2.3 In summary, how close is the relationship between regional development and gender inequality?



▲ **FIGURE 9-26 ADOLESCENT FERTILITY RATE** The adolescent fertility rate is the number of births per 1,000 women ages 15 to 19.
Source: United Nations



▶ **FIGURE 9-27 TREND IN MATERNAL MORTALITY RATE, 1990–2021** The maternal mortality rate is the number of deaths of mothers in childbirth per 100,000 live births.
Source: United Nations

Empowerment

In the context of gender inequality, empowerment refers to the ability of women to achieve improvements in their own status – that is, to achieve economic and political power. The empowerment dimension of GII is measured by two indicators: the percentage of seats held by women in the national legislature and the percentage of women who have completed some secondary school (high school).

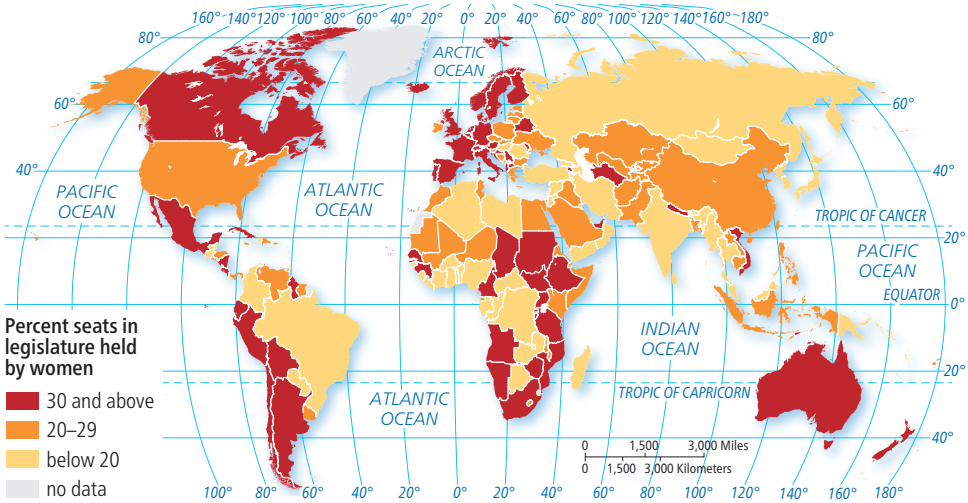
Empowerment: National Legislature. No particular gender-specific skills are required to be elected as a government representative and to serve effectively. But in every country of the world, both developed and developing, fewer women than men hold positions of political power.

Although more women than men vote in most places, only three countries (Bolivia, Cuba, and Rwanda) have a national parliament or congress with a majority of women (Figure 9-28). With a few exceptions, the highest percentages are in Europe, where women comprise approximately one-fourth of the members of national parliaments. The lowest rates of women in national legislature are in Southwest Asia & North Africa.

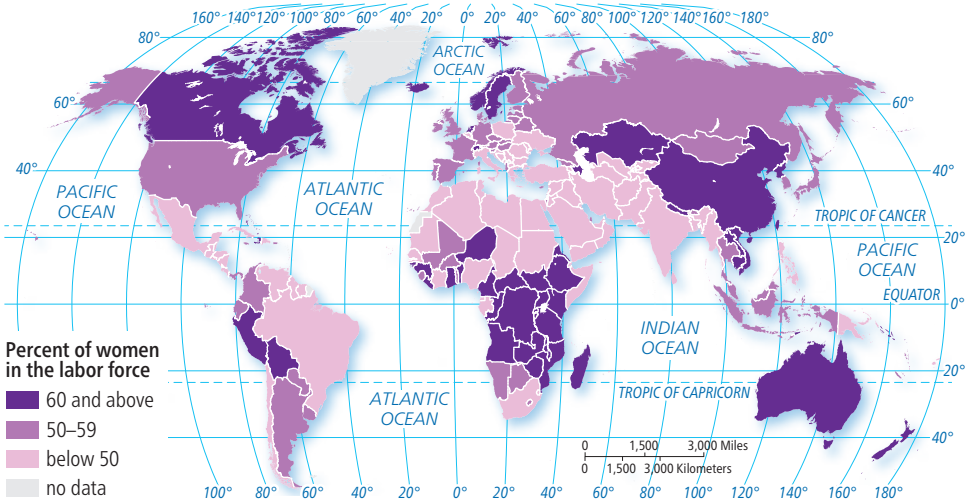
In the United States, 28 percent of the House of Representatives (124 of 435 members) were women in 2023. The percentage was only 19 percent prior to the 2018 election. In 2022, Canada's House of Commons included 30 percent women, and the United Kingdom's House of Commons included 35 percent women (Figure 9-29).

Empowerment: Secondary School. Worldwide, 64 percent of women have completed some secondary (high) school, compared to 70 percent of men. In North America, girls are more likely than boys to complete some high school, and boys are slightly ahead in Europe. In developing countries, boys are much more likely than girls to be high school graduates. For every ten boys who attend high school in developing countries, only six girls attend. The gap in education between girls and boys is especially high in South Asia.

▲ **FIGURE 9-28 WOMEN IN PARLIAMENT: RWANDA** Women comprise more than 60 percent of the members of Rwanda's national parliament.



▲ **FIGURE 9-29 WOMEN IN THE NATIONAL LEGISLATURE** The highest percentages are in Europe, and the lowest are in Southwest Asia & North Africa.
Source: United Nations



▲ **FIGURE 9-30 LABOR FORCE PARTICIPATION** A lower number means that relatively few women participate in the labor force compared with men.
Source: United Nations

Employment

The **female labor force participation rate** is the percent of women holding full-time jobs outside the home. Worldwide, 46 percent of women work outside the home, compared to 72 percent of men. In general, women in developed countries are more likely than women in developing countries to hold full-time jobs outside the home.

Figures vary widely among developing regions. South Asia and Southwest Asia & North Africa have substantial gaps between male and female labor participation, whereas East Asia and sub-Saharan Africa have smaller gaps (Figure 9-30). Women hold jobs in agriculture or services in sub-Saharan Africa, even while they have the world's highest fertility rates.

Gender Development & Bias

Learning Outcome 9.2.4 Describe empowerment-related components of gender inequality.

Underlying the challenges faced by women, as demonstrated by the GII and GDI, is the prevalence of attitudes favoring men in many parts of the world. In recent years, the #MeToo movement has been a social movement against sexual abuse and discrimination. In India, the #IWillGoOut movement has demanded equal rights for women, and in Latin America, the #NiUnaMenos movement has highlighted violence against women.

Gender Attitudes

To measure the strength of attitudes biased against women, the U.N. has constructed the **Gender Social Norms Index (GSNI)**. According to the GSNI, around half of the people in developed countries have biased attitudes against the aspirations of women, whereas in developing countries at least some bias against women is nearly universal (Figure 9-31).

Unlike other U.N. development indexes, the GSNI is based on surveys of people's attitudes rather than based on demographic or economic data. The GSNI is calculated for each country by obtaining a random sample of responses to seven statements. The GSNI measures the extent to which people in different countries are biased against women in four dimensions: the economy, education, political power, and health. In addition to an overall GSNI, separate indexes are constructed for each of the four dimensions, and separate indexes are constructed for male and female respondents.

Economic Empowerment Index. Attitudes toward economic empowerment are based on responses to two statements: "Men should have more right to a job than women" and "Men make better business executives than women do." Respondents are classified by the U.N. as "biased" if they strongly agree or agree with the statements. Based on responses to these two questions, the GSNI classifies around two-thirds of people in developing countries and one-fourth of people in developed countries (including one-sixth in the United States) as biased against women's economic aspirations (Figure 9-32).

Educational Empowerment Index. The GSNI bases the educational empowerment index on responses to this statement: "University is more important for a man than for a woman." Respondents are classified by the U.N. as "biased" if they strongly agree or agree with the statement. This statement had the lowest level of bias in both developing countries (around one-third) and in developed countries (around 5 percent).

Political Empowerment Index. Attitudes toward political empowerment are based on responses to two statements: "Men make better political leaders than women do" and "Women have the same rights as men." Respondents are classified by the U.N. as "biased" if they strongly agree or agree with the first statement, and they are considered "biased" if they respond "not essential" to the second statement. Based on responses to these two questions, the GSNI classifies around three-fourths of people in developing countries and one-fourth of people in developed countries (including 40 percent in the United States) as biased against women's political aspirations.

Health Index. Attitudes toward physical integrity are based on responses to these two statements: "My intimate partner is never violent with me" or "I am never violent with my intimate partner" and "I have reproductive rights" or "My intimate partner has reproductive rights." Respondents are classified by the U.N. as "biased" if they disagree with the statements. Based on responses to these two statements, the GSNI classifies around two-thirds of people in developing countries and one-third of people in developed countries as biased against women's physical integrity rights.

FIGURE 9-31 GENDER SOCIAL NORMS INDEX A higher number means a higher level of gender bias according to U.N. surveys.

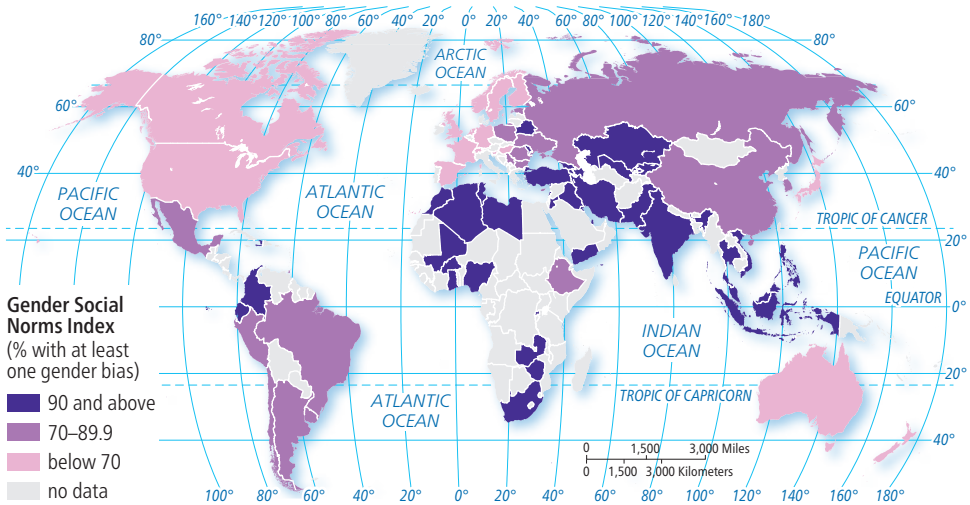


FIGURE 9-32 ECONOMIC EMPOWERMENT The CEO and President of VietJet Airways, Nguyễn Thị Phuong Thảo, is a rare example of a corporate leader in a developing country with a GSNI index of above 90.

Development Challenges for Pakistan's Women

The U.N. classifies Pakistan's level of development as medium developing. Its HDI ranks just above the cutoff for inclusion as low developing. Pakistan's development prospects can be viewed through the four dimensions that contributed to understanding attitudes toward women, as reflected in the GSNI: political power, education, the economy, and physical integrity.

Economic Obstacles. The GDI estimates that the average annual income in Pakistan is only $1,569 for women, compared with $7,620 for men. One reason that women in Pakistan have much lower incomes than men is the low rate of participation in the labor force (21 percent for Pakistani women compared with 78 percent for Pakistani men), according to the GII (Figure 9-33). According to the GSNI, 95 percent of Pakistanis believe that men have more of a right to jobs than women.

Education Obstacles. Education is essential for obtaining a job. In Pakistan, according to the GDI, women attend school for an average of 3.9 years, compared to 5.0 years for men. According to the GII, only 22 percent of adult women have at least some high school education in Pakistan, compared with 29 percent of adult men. Around one-half of Pakistanis feel that attending a university is more important for men than for women (Figure 9-34).

Political Obstacles. Around 20 percent of the members of Pakistan's Parliament are women, about average for developing countries. However, 87 percent of Pakistani men believe that men make better political leaders than women, according to the GSNI. Democracy & Empowered Women is a nonprofit organization that promotes inclusive democratic processes and participation in Pakistan for the advancement of women's rights and at-risk populations, such as minorities (Figure 9-35).

Physical Integrity Obstacles. Pakistan's maternal mortality rate (140 deaths per 100,000 live births) and adolescent mortality rate (42 births per 1,000 teenagers) are higher than in developed countries, though lower than average for developing countries. Women live two years longer than men in Pakistan, 69 years compared with 64 years, but life expectancy for both men and women in Pakistan is shorter than average for developing countries.

Pause & Reflect 9.2.4 Which of the four sets of obstacles to development faced by women appear to be the most important ones for Pakistan?

▲ **FIGURE 9-33 ECONOMIC EMPOWERMENT, PAKISTAN** An artist paints a girl's face during an event to encourage small businesses run by women, Islamabad, Pakistan.

▲ **FIGURE 9-34 EDUCATION EMPOWERMENT, PAKISTAN** Women celebrate the end of the school year, Lahore, Pakistan.

▶ **FIGURE 9-35 POLITICAL EMPOWERMENT, PAKISTAN** Workshop supporting women leadership, Quetta, Pakistan.

KEY ISSUE

9.3 | Why Do Countries Face Development Challenges?

Many developing countries lack much of what people in developed countries take for granted, such as access to electricity, safe drinking water, and paved roads. To reduce disparities with developed countries, developing countries must increase their rate of economic growth. This means increasing per capita GNI more rapidly and using the additional funds to improve social and economic conditions.

Two Paths to Development

Learning Outcome 9.3.1 Summarize the two paths to development.

Developing countries face two fundamental challenges in trying to encourage development:

- Adopting policies that successfully promote and sustain development.
- Finding funds to pay for development.

To promote development, developing countries choose one of two models: self-sufficiency or international trade.

Self-Sufficiency Path

In the self-sufficiency model, countries encourage domestic production of goods, discourage foreign ownership of businesses and resources, and protect their businesses from international competition. Key elements of the self-sufficiency path to development include the following:

- **Import limits.** Barriers limit the import of goods from other places. Three barriers include setting high taxes (tariffs) on imported goods to make them more expensive than domestic goods, fixing quotas to limit the quantity of imported goods, and requiring licenses in order to restrict the number of importers.
- **Insulation.** Fledgling businesses are nursed to success by being isolated from competition with large international corporations. Such insulation from businesses and governments in developed countries encourages a developing country's fragile businesses to achieve independence.
- **Equal investment.** Investment is spread as equally as possible across all sectors of a developing country's economy and in all regions.
- **Equal income.** Incomes in the countryside keep pace with those in the city, and reducing poverty takes precedence over encouraging a few people to become wealthy consumers.

▲ **FIGURE 9-36 SELF-SUFFICIENCY IN INDIA: BUREAUCRACY** Government official works at an outside desk, Kolkata, India.

India Under Self-Sufficiency

For several decades after it gained independence from the United Kingdom in 1947, India was a leading example of the self-sufficiency strategy. Policies included limiting foreign companies from importing into India and exercising strong control over companies operating in India.

Here are some of the ways that India controlled imports:

- **Licenses.** To import goods into India, most foreign companies had to secure a license, which was a long and cumbersome process because several dozen government agencies had to approve each request.
- **Import limits.** A company holding an import license was severely restricted in how much it could actually import into India.
- **Taxes.** Heavy taxes on goods imported to India raised the prices that consumers had to pay.
- **Nonconvertible currency.** Indian money could not be converted to other currencies.

Here are examples of the ways that India controlled its own companies:

- **Permits.** A business in India needed government permission to sell a new product, modernize a factory, expand production, set prices, hire or fire workers, and change the job classification of existing workers (Figure 9-36).
- **Subsidies.** An unprofitable Indian business received government subsidies, such as cheap electricity or elimination of debts.
- **Government ownership.** The Indian government itself owned not just communications, transportation, and power companies, which is common around the world, but also businesses such as insurance companies and automakers, which are owned by private companies in most countries.

Many of these controls were reduced or eliminated, especially during the 1990s, when India began to move from self-sufficiency toward international trade.

International Trade Path

In the international trade model, countries open themselves to foreign investment and international markets. For most of the twentieth century, self-sufficiency, or balanced growth, was the more popular of the development alternatives. International trade became more popular beginning in the late twentieth century.

The international trade model of development calls for a country to identify its distinctive or unique economic assets. What animal, vegetable, or mineral resources does the country have in abundance that other countries are willing to buy? What product can the country manufacture and distribute at a higher quality and a lower cost than other countries? According to the international trade approach, a country can develop economically by concentrating scarce resources on expansion of its distinctive local industries. The sale of these products in the world market brings into the country funds that can be used to finance other development.

Rostow's International Trade Model. A pioneering advocate of the international trade approach was W. W. Rostow, who in the 1950s proposed a five-stage model of development. According to Rostow's international trade model, each country is in one of these five stages of development:

1. **Traditional society.** A traditional society has not yet started a process of development. It contains a very high percentage of people engaged in agriculture and a high percentage of national wealth allocated to what Rostow called "nonproductive" activities, such as the military and religion.
2. **Preconditions for takeoff.** A precondition for takeoff of development is the initiation by an elite group within society of innovative economic activities. Under the influence of these well-educated leaders, the country starts to invest in new technology and infrastructure, such as water supplies and transportation systems. Support from international funding sources often emphasizes the importance of constructing new infrastructure. These projects will ultimately stimulate an increase in productivity.
3. **Takeoff.** Rapid growth in a country's development is generated with a limited number of economic activities, such as textiles or food products. These few takeoff industries achieve technical advances and become productive, whereas other sectors of the economy remain dominated by traditional practices.
4. **Drive to maturity.** Modern technology, previously confined to a few takeoff industries within a country, diffuses to a wide variety of industries throughout the country, which then experience rapid growth comparable to the growth of the takeoff industries. Workers become more skilled and specialized.
5. **Age of mass consumption.** During an age of mass consumption, the economy of a country shifts from production of heavy industry, such as steel and energy, to consumer goods, such as motor vehicles and electronic equipment.

International Trade Examples

When most developing countries were following the self-sufficiency approach during the twentieth century, two groups of countries chose the international trade approach:

The Four Dragons. Among the first places to adopt the international trade path were South Korea, Singapore, Taiwan, and Hong Kong, known as the "four dragons." Singapore and Hong Kong, British colonies until 1965 and 1997, respectively, were large cities surrounded by very small amounts of rural land and had virtually no natural resources. Lacking many natural resources, the four dragons promoted development by concentrating on producing a handful of manufactured goods, especially clothing and electronics. Low labor costs enabled these countries to mass produce and sell products inexpensively in developed countries.

Petroleum-Rich Arabian Peninsula States. The Arabian Peninsula includes Saudi Arabia, the region's largest and most populous country, as well as Bahrain, Kuwait, Oman, Qatar, and the United Arab Emirates. Once among the world's least developed countries, they were transformed overnight into some of the highest GNIs per capita, thanks to escalating petroleum prices beginning in the 1970s. Arabian Peninsula countries used petroleum revenues to finance large-scale projects, such as housing, highways, hospitals, airports, universities, and telecommunications networks. Their steel, aluminum, and petrochemical factories competed on world markets with the help of government subsidies. The landscape of these countries has been further changed by the diffusion of consumer goods, such as motor vehicles and electronics. Supermarkets in Arabian Peninsula countries are stocked with food imported from Europe and North America (Figure 9-37).

Pause & Reflect 9.3.1 Many countries that have adopted the international trade model are relatively small states (see Chapter 8). Why might a nation's size be a factor in the early adoption of the international trade path?

▼ **FIGURE 9-37 DEVELOPMENT THROUGH INTERNATIONAL TRADE** Supermarket, Doha, Qatar.

World Trade

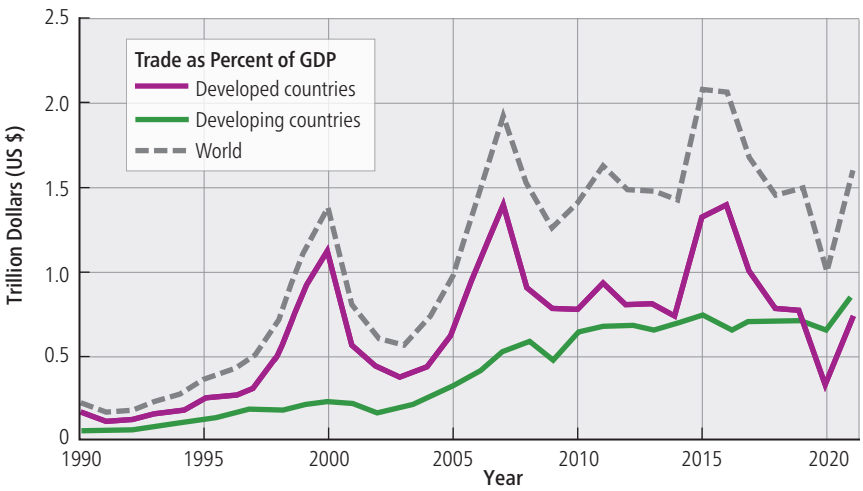
Learning Outcome 9.3.2 Analyze reasons for the triumph of the international trade approach to development.

During the late twentieth century and into the twenty-first century, most countries embraced the international trade approach as the preferred alternative for stimulating development. Long-time advocates of self-sufficiency, such as India, converted to international trade at that time.

International Trade Triumphs

Trade increased more rapidly than wealth (as measured by GDP) during the late twentieth and early twenty-first centuries. This is a measure of the growing importance of the international trade approach (Figure 9-38). Optimism about the benefits of the international trade development model was based on three observations:

- **Other countries' success.** Developed countries in Europe and North America were joined by others elsewhere in the world, such as Japan and South Korea, during the late twentieth century. If they could become more developed by following this model, why couldn't other countries?
- **Resource riches.** Developing countries contain an abundant supply of many raw materials sought by manufacturers and producers in developed countries. In the past, European colonial powers extracted many of these resources without paying compensation to the colonies. In a global economy, the sale of these raw materials could generate funds for developing countries with which they could promote development.
- **International competitiveness.** A country that concentrates on international trade benefits from exposure to the demands, needs, and preferences of consumers in other countries. To remain competitive, the takeoff industries constantly evaluate changes in international consumer preferences, marketing strategies, production engineering, and design technologies. Concern for international competitiveness in the exporting takeoff industries can filter through other sectors of the economy.



▲ **FIGURE 9-38 INTERNATIONAL TRADE AS A PERCENTAGE OF GDP**
Source: World Bank

▲ **FIGURE 9-39 WORLD TRADE ORGANIZATION HEADQUARTERS, GENEVA, SWITZERLAND** The sculpture by James Vibert is called "Human Effort."

World Trade Organization

To promote the international trade development model, countries representing 97 percent of world trade established the World Trade Organization (WTO) in 1995 (Figure 9-39). The WTO works to reduce barriers to international trade in two principal ways.

Reduce Restrictions. Through the WTO, countries negotiate reduction or elimination of international trade restrictions on manufactured goods, such as government subsidies for exports, quotas for imports, and tariffs on both imports and exports. Also reduced or eliminated are restrictions on the international movement of money by banks, corporations, and wealthy individuals.

Enforcement. The WTO also promotes international trade by enforcing agreements. One country can bring to the WTO an accusation that another country has violated a WTO agreement. The WTO is authorized to rule on the validity of the charge and order remedies. The WTO also tries to protect intellectual property in the age of the internet. An individual or a corporation can also bring charges to the WTO that someone in another country has violated a copyright or patent, and the WTO can order illegal actions to stop.

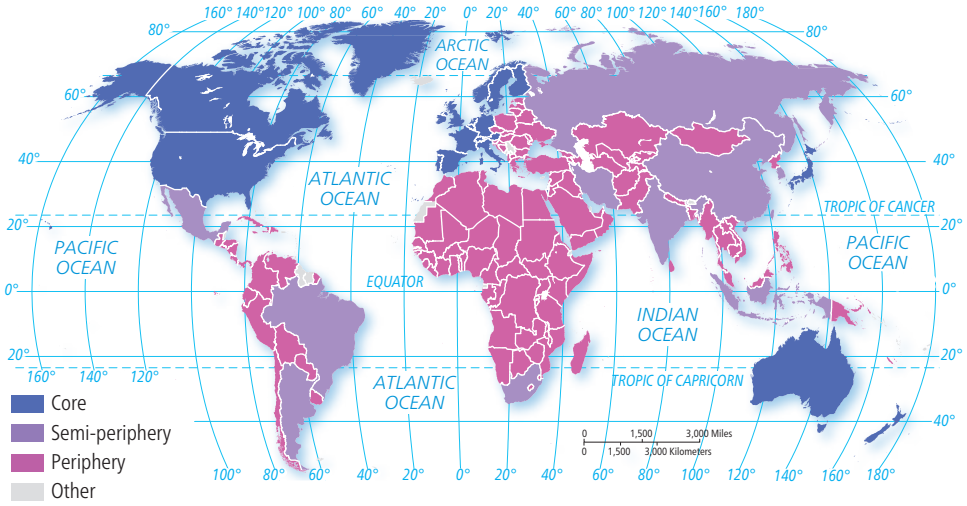
Critics have sharply attacked the WTO. Protesters routinely gather in the streets outside high-level meetings of the WTO. Progressive critics charge that the WTO is antidemocratic because decisions made behind closed doors promote the interests of large corporations rather than people of low incomes. Conservatives charge that the WTO compromises the power and sovereignty of individual countries because it can order changes in taxes and laws that could result in unfair trading practices.

Pause & Reflect 9.3.2 Top WTO officials meet every two years in a ministerial conference. Where was the most recent conference held?

Core & Periphery

Immanuel Wallerstein, a U.S. social scientist, describes the relationship between developed and developing countries as one of "core" and "periphery." According to Wallerstein's **world-systems theory**, in an increasingly unified world economy, developed countries form an inner core area, whereas developing countries occupy peripheral locations.

Countries in Africa, Asia, and Latin America contain three-fourths of the world's population and nearly all of its population growth. However, these countries find themselves on a periphery, or outer edge, with respect to the wealthier core regions of North America, Europe, and Japan.



▲ **FIGURE 9-40 CORE & PERIPHERY: NORTH-SOUTH DIVIDE** Developed regions are located mostly to the north and developing regions farther south. In world systems theory, developed regions are classified as core and most developing regions as periphery. A handful of developing countries are now classified as semi-periphery.

The relationship between developed countries and developing countries appears on a traditional projection as a north-south split because most of the developed countries of the core (except for Australia and New Zealand) are in the Northern Hemisphere's temperate zone north of the Tropic of Cancer, whereas many developing countries are to the south (Figure 9-40).

An unusual north polar projection portrays more graphically the core-periphery relationship between developed and developing regions (Figure 9-41). The core regions are positioned at the center, and the peripheral regions are located in outer rings.

Global investment arrives from the core through hierarchical diffusion of decisions made by transnational corporations. Particular core and periphery regions have special connections (Figure 9-42). The development prospects of Latin America are tied to governments and businesses primarily in North America, those of Africa and Eastern Europe to Western Europe, and those of Asia to Japan and to a lesser extent Europe and North America. As countries such as China, India, and Brazil develop, relationships between core and periphery are changing, and the line between core and periphery may need to be redrawn.

Since the original formulation of world systems theory, an increasingly important element has been the emergence of countries classified as semi-periphery. These are countries that are either intermediate in level of economic development or situated close to both core and periphery regions. Examples include Brazil, China, India, and Mexico. Countries in the semi-periphery are home to much of the world's manufacturing (see Chapter 11).

▲ **FIGURE 9-41 CORE & PERIPHERY: NORTH POLAR PROJECTION** When seen from the North Pole, developed regions form an inner core and developing regions an outer periphery.

▲ **FIGURE 9-42 CORE & PERIPHERY INTERACT** Used cars are being exported from a core country (Germany) to a periphery country (Benin).

Financing Development

Learning Outcome 9.3.3 Identify the main sources for financing development.

Developing countries lack money to fund development, so they obtain financial support from developed countries. Finance comes from two primary sources: direct investment by transnational corporations and loans from banks and international organizations.

Foreign Direct Investment

International trade requires corporations based in a particular country to invest in other countries. Investment made by a foreign company in the economy of another country is known as **foreign direct investment (FDI).** FDI has grown rapidly from $243 billion in 1990 to $1.7 trillion in 2021 (Figure 9-43).

Investment does not flow equally around the world (Figure 9-44). Only one-third of FDI went to developing countries, while the other two-thirds went to developed countries. And FDI is not evenly distributed among developing countries. In 2021, 39 percent of all FDI destined for developing countries went to East Asia, primarily China, and another 21 percent to Southeast Asia, primarily Singapore (Figure 9-45).

The major sources of FDI are transnational corporations that invest and operate in countries other than the one in which the company headquarters are located. Of the 500 largest transnational corporations in 2022, 325 had headquarters in developed countries, including 124 in the United States. China (including Hong Kong) was the location of 136 of the 175 with headquarters in developing countries.

Pause & Reflect 9.3.3 Why might Apple, Microsoft, and Alphabet (Google) rank as three of the world's largest transnational corporations?

International Monetary Fund

The two major lenders to developing countries are the International Monetary Fund (IMF) and the World Bank. The IMF provides loans to countries experiencing balance-of-payments problems that threaten expansion of international trade. IMF assistance is designed to help a country rebuild international reserves, stabilize currency exchange rates, and pay for imports without the imposition of harsh trade restrictions or capital controls that could hamper the growth of world trade. Unlike development banks, the IMF does not lend for specific projects. Funding of the IMF is based on each member country's relative size in the world economy.

FIGURE 9-43 GROWTH IN FDI
Source: United Nations

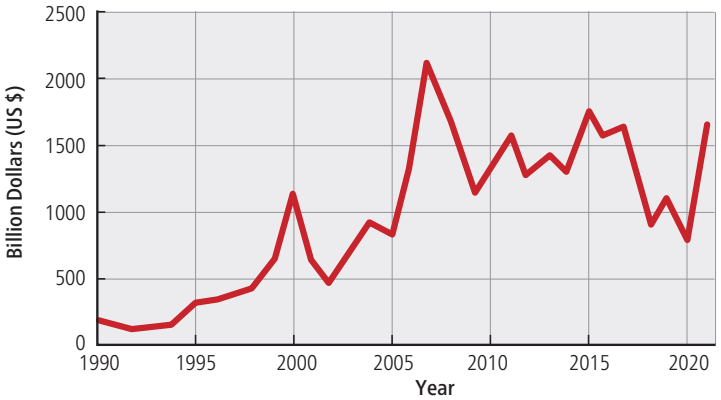


FIGURE 9-44 SOURCES AND DESTINATIONS OF FDI
Source: United Nations

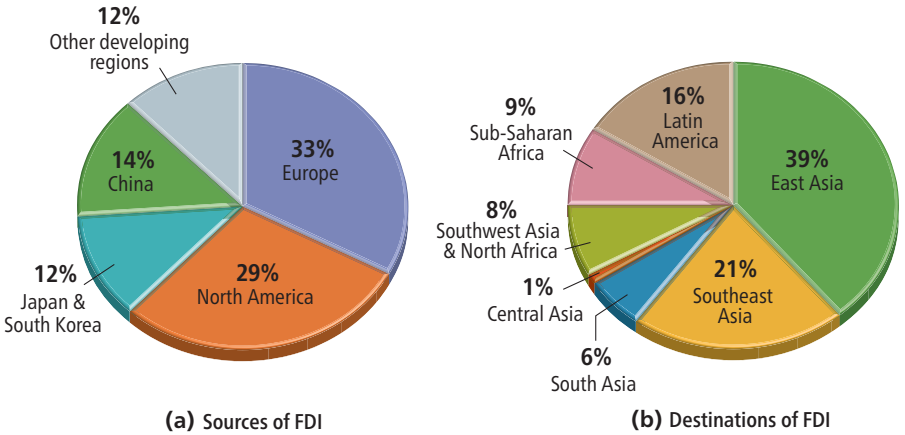


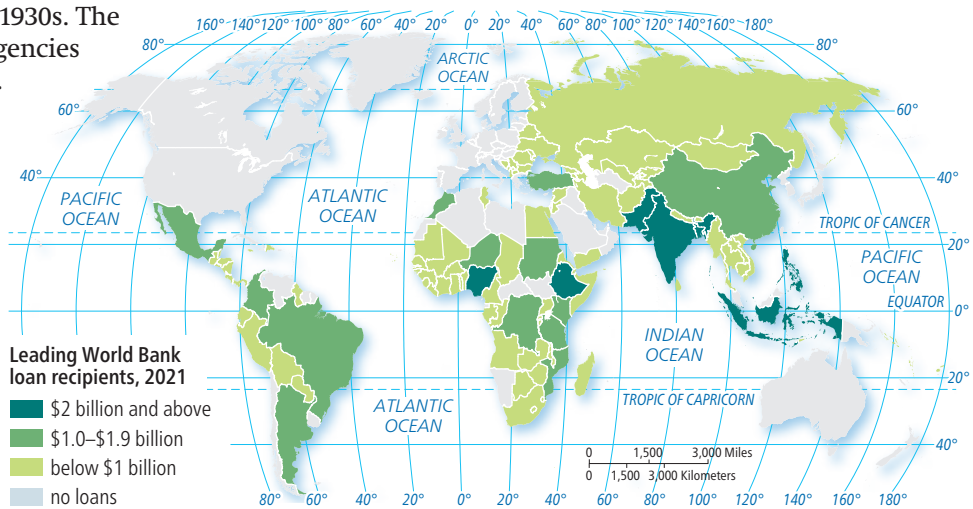
FIGURE 9-45 FOREIGN DIRECT INVESTMENT South Korea's Hyundai Motors operates a factory in Yancheng, China, to manufacture its Kia brand cars.

World Bank

The World Bank includes the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). The IBRD provides loans to countries to reform public administration and legal institutions, develop and strengthen financial institutions, and implement transportation and social service projects (Figure 9-46). The IDA provides support to developing countries considered too risky to qualify for IBRD loans. The IBRD lends money raised from sales of bonds to private investors; the IDA lends money from government contributions. In 2021, the World Bank made around $100 billion worth of loans, grants, equity investments, and guarantees. Seven countries received more than $2 billion each in 2021: Bangladesh, India, and Pakistan in South Asia; Indonesia and Philippines in Southeast Asia; and Ethiopia and Nigeria in sub-Saharan Africa (Figure 9-47).

The World Bank and IMF were conceived at a 1944 United Nations Monetary and Financial Conference in Bretton Woods, New Hampshire, to promote economic development and stability after the devastation of World War II and to avoid a repetition of the disastrous economic policies that contributed to the Great Depression of the 1930s. The IMF and World Bank became specialized agencies of the U.N. when it was established in 1945.

▲ **FIGURE 9-46 WORLD BANK PROJECT** Sign in Nakuru, Kenya, announces start of a project to improve bike lanes, sidewalks, street lighting, and storm water drainage with funds from the World Bank.



▲ **FIGURE 9-47 WORLD BANK LOANS**

Microfinance for Development

Many would-be business owners in developing countries lack the collateral to qualify for regular bank loans. An alternative source of loans is **microfinance**, which is the provision of small loans and other financial services to individuals and small businesses in developing countries that are unable to obtain loans from commercial banks (Figure 9-48).

A prominent example of microfinance is the Grameen Bank, which was established in 1977. Based in Bangladesh, Grameen specializes in making loans to women, who make up three-fourths of the borrowers. Approximately two-thirds of the artisans providing fair trade handcrafted products are women. Often these women are mothers and the sole wage earners in the home. Women have borrowed money to buy cows, make perfume, bind books, and sell matches, mirrors, and bananas. For founding the bank, Muhammad Yunus was awarded the Nobel Peace Prize in 2006.

The Grameen Bank has made several hundred thousand loans to women in Bangladesh and neighboring South Asian countries, and only 1 percent of the borrowers have failed to make their weekly loan repayments, an extraordinarily low percentage for a bank. Several million loans have also been provided to women by the Bangladesh Rural Advancement Committee. The average loan is about $60. The smallest loan the bank has made was $1, to a woman who wanted to sell plastic bangles door to door.

▲ **FIGURE 9-48 MICROFINANCE** The Peermade Development Society, Kerala, India, makes microloans to women trying to start small businesses.

Challenges in Adopting International Trade

Learning Outcome 9.3.4 Explain alternate strategies for coping with the costs of development.

Some countries have had difficulties making progress in development. Unable to repay loans, some countries have been forced to adopt unpopular austerity programs.

Shortcomings of Self-Sufficiency

International trade was embraced because of perceived shortcomings of self-sufficiency. Self-sufficiency was rejected for a number of reasons:

- **Inefficient industries.** Businesses could sell all they made, at high government-controlled prices, to customers culled from long waiting lists, so the businesses had little incentive to improve quality, lower production costs, reduce prices, or increase production.
- **Lack of competitiveness.** Companies protected from international competition were not pressured to keep abreast of rapid technological changes or give high priority to sustainable development.
- **Corruption.** The system gave unmonitored power to bureaucrats, thus encouraging abuse and corruption.
- **Black market.** Ambitious businessmen found it more rewarding than illegally importing goods and selling them at inflated prices on the black market.

Loan Debt & Repayment

Developing countries borrow money to build new infrastructure, such as hydroelectric dams, electric transmission lines, flood-protection systems, water supplies, roads, and hotels. The theory is that new infrastructure will make conditions more favorable for domestic and foreign businesses to open or expand. After all, no business wants to be located in a place that lacks paved roads, running water, and electricity.

In reality, the World Bank itself has judged half the projects it has funded in Africa to be failures. Common reasons include the following:

- Projects don't function as intended because of faulty engineering.
- Recipient nations squander or spend aid on armaments, or the aid is stolen through corruption.
- New infrastructure does not attract other investment.

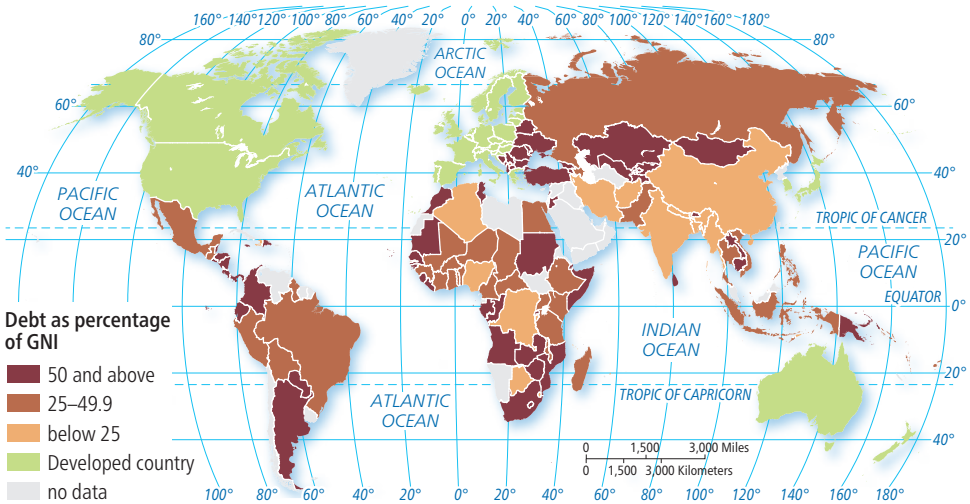
Some countries have been unable to repay the interest on their loans, let alone the principal. Debt actually exceeds annual income in a number of countries (Figure 9-49). When countries cannot repay their debts, financial institutions in developed countries refuse to make further loans, so construction of needed infrastructure stops.

Stimulus or Austerity?

Political leaders and independent analysts have been sharply divided on the optimal strategy for a developing country to cope with their debt. Choose a stimulus strategy or choose an austerity strategy?

- **Stimulus strategy.** Proponents of stimulus argue that during a downturn, governments should spend more money than they collect in taxes. Governments should stimulate the economy by putting people to work building bridges and other needed infrastructure projects. Once the economy recovers, they say, people and businesses will be in a position to pay more taxes and pay off the debt.
- **Austerity strategy.** Proponents of austerity argue that government should sharply reduce taxes so that people and businesses can revive the economy by spending their tax savings. Spending on government programs should be sharply cut as well in order to keep the debt from swelling and hampering the economy in the future.

Most developed countries employed the stimulus strategy in 2020 and 2021 in an attempt to overcome the economic downtown triggered by the COVID-19 shutdown. Developing countries do not always get to choose between austerity and stimulus. The IMF, World Bank, and economically stronger developed countries fear that granting, canceling, or refinancing debts without strings attached could harm developing countries in the long run. Therefore, to apply for debt relief, developing countries are often required to adopt austerity programs that impose strict limits on government spending and borrowing.



▲ **FIGURE 9-49 DEVELOPING COUNTRY DEBT AS A PERCENTAGE OF GNI**

Structural Adjustment Programs

Austerity can be imposed through a policy framework paper (PFP) that outlines economic goals, strategies for achieving the goals, and financial support needed to achieve the goals. A **structural adjustment program** is a set of reforms that a developing country must adopt to implement the PFP and secure financial support from the IMF, the World Bank, or a developed country. Reforms required of a developing country typically include:

- Spending only what it can afford.
- Directing benefits to the disadvantaged, not just the elite.
- Diverting investment from military spending to health and education spending.
- Investing scarce resources where they will have the most impact.
- Encouraging a more productive private sector.
- Reforming the government, including making the civil service more efficient, increasing accountability in fiscal management, implementing more predictable rules and regulations, and disseminating more information to the public.

Critics charge that poverty worsens under structural adjustment programs. By placing priority on reducing government spending and inflation, structural adjustment programs may result in the following:

- Cuts in health, education, and social services that benefit people with limited incomes.
- Higher unemployment.
- Loss of jobs in state enterprises and civil service.
- Less support for those most in need, such as pregnant women with limited incomes, nursing mothers, young children, and elderly people.

In short, structural reforms allegedly punish Earth's powerless people in developing countries for actions they did not commit, such as waste, corruption, misappropriation, and military buildup. The economic pain of structural adjustment programs, as well as a sense that the international trade model leaves developing countries vulnerable to exploitation by developed countries, has led some to consider a return to the self-sufficiency model of development.

International organizations respond that the people with limited incomes suffer more when a developing country does not undertake reforms. Economic growth is what benefits people the most in the long run. Nevertheless, in response to criticisms, the IMF and the World Bank now encourage innovative programs to reduce poverty and corruption and consult more with average citizens. A safety net must be included to ease short-term pain experienced by vulnerable people.

Pause & Reflect 9.3.4 Do the terms of a structural adjustment program seem harsh for a country or fair? Why?

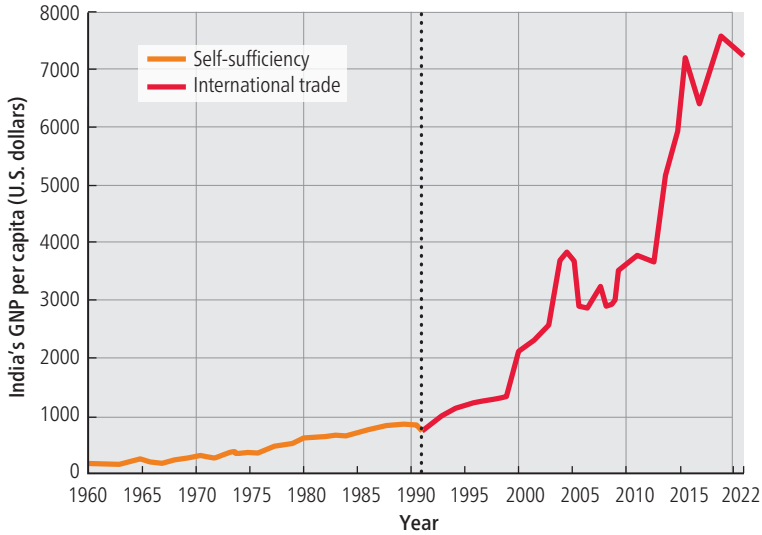
India Under International Trade

India is an example of a country that converted from self-sufficiency to international trade during the 1990s. The government dismantled its formidable collection of barriers to international trade:

- **Permits.** Foreign companies were allowed to set up factories and sell in India with an easier permit process.
- **Taxes and quotas.** Tariffs and restrictions on the import and export of goods were reduced or eliminated.
- **Competition.** Monopolies in communications, insurance, and other industries were eliminated.

With increased competition, Indian companies have improved the quality of their products. For example, during the self-sufficiency era, India's auto industry was dominated by Maruti-Udyog Ltd., which was controlled by the Indian government. Nursed by import duties that rose from 15 percent in 1984 to 66 percent in 1991, Maruti captured more than 80 percent of the Indian market by selling cars that would be considered out-of-date in other countries. In the international trade era, the government sold control of Maruti to the Japanese company Suzuki, which now holds less than 40 percent of India's market.

Under self-sufficiency, India's GDP per capita remained very low, reaching only $1,180 in 1990. After converting to international trade, India's GDP per capita increased rapidly and exceeded $7,000 in 2022 (Figure 9-50). Worldwide, GDP per capita increased more than 4 percent annually in countries strongly oriented toward international trade compared with less than 1 percent in countries strongly oriented toward self-sufficiency.



▲ **FIGURE 9-50 GDP PER CAPITA CHANGE IN INDIA** India's per capita GDP has grown more rapidly since the country converted from the self-sufficiency path to the international trade path.

KEY ISSUE

9.4 | Why Are Countries Able to Make Progress in Development?

The development indicators established in the past reveal uneven progress. An increasing emphasis on sustainable development has resulted in the creation of new measures of progress.

Sustainable Development

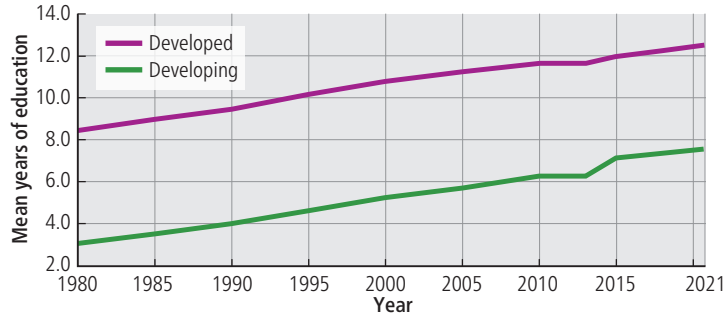
Learning Outcome 9.4.1 Describe ways in which differences in development have narrowed or increased.

Indicators of Progress

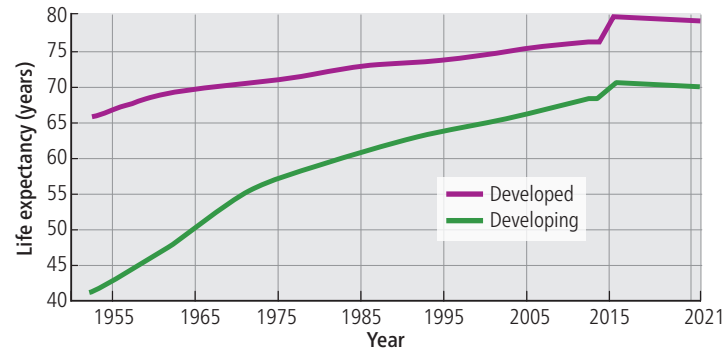
Since the U.N. began measuring HDI in 1980, both developed and developing regions have made progress in HDI, as well as in the variables contributing to HDI. However, progress varies among the three factors contributing to HDI. Here is a summary of the progress made in HDI since 1980:

- **GNI per capita.** GNI per capita has increased more rapidly in developed countries than in developing countries (refer to Figure 1-49).
- **Education.** Years of education has increased by around the same number in developed and developing countries (Figure 9-51).
- **Life expectancy.** Life expectancy has increased by around the same number in developed and developing countries (Figure 9-52).
- **HDI.** The gap in HDI between developed countries and developing countries has narrowed since 1980 (Figure 9-53).

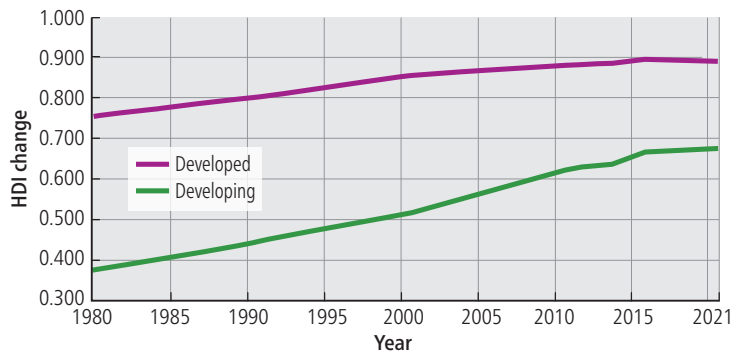
The U.N. Human Development Report added a new index in 2020 called the **Planetary pressures-adjusted Human Development Index (PHDI)**. The PHDI modifies the HDI by accounting for two resource factors: CO_2 emissions per person and the raw materials needed to meet consumer demand. The U.N. argues that further progress in human development is impossible without addressing environmental concerns. When the two PHDI resource factors are folded into the HDI score, some developed countries fall to lower ranks (compare Figure 9-2 to Figure 9-54).



▲ **FIGURE 9-51 CHANGE IN EDUCATION**

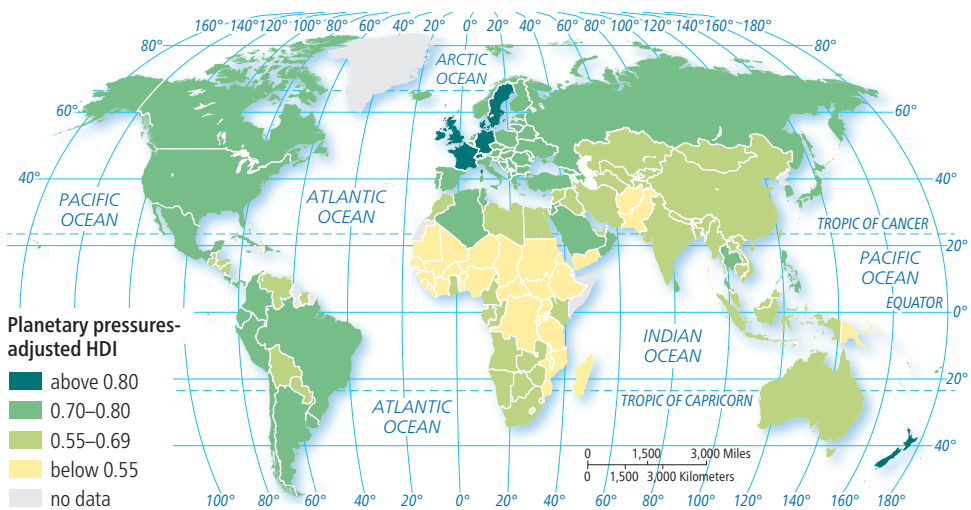


▲ **FIGURE 9-52 CHANGE IN LIFE EXPECTANCY**



▲ **FIGURE 9-53 CHANGE IN HDI**

▼ **FIGURE 9-54 PLANETARY PRESSURES-ADJUSTED HUMAN DEVELOPMENT INDEX**



Sustainable Development Goals

To reduce disparities between developed and developing countries, the 193 members of the United Nations adopted 17 Sustainable Development Goals in 2015 (Table 9-1). All U.N. members agreed to achieve these goals by 2030. The **Sustainable Development Goals** replaced eight **Millennium Development Goals**, which had been adopted in 2002.

Pause & Reflect 9.4.1 Which Sustainable Development Goals appear to be making the most limited progress? Why might that be the case?

TABLE 9-1 | U.N. Sustainable Development Goals

Goal	Comment
1. End poverty in all its forms everywhere.	The percentage of people living in poverty in the world has been cut in half since 1990, but around 700 million people live in extreme poverty, which the World Bank defines as earning less than $1.90 per day.
2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.	The U.N. estimates 828 million people are undernourished. It wants to double agricultural productivity by 2030.
3. Ensure healthy lives, and promote well-being for all at all ages.	The world infant mortality rate has declined from 57 per 1,000 live births in 2000 to 29 per 1,000 in 2022. The U.N. hopes to reduce these rates further by 2030.
4. Ensure inclusive and quality education for all, and promote lifelong learning.	The U.N. wants to ensure that all children attend school, and it estimates that 57 million children of primary school age do not attend school, more than half of whom are in sub-Saharan Africa.
5. Achieve gender equality, and empower all women and girls.	Gender inequalities have been reduced but persist in all regions, as discussed in Key Issue 2.
6. Ensure access to water and sanitation for all.	According to the U.N., 884 million people lack access to drinking water, and 2.2 billion lack access to safely managed sanitation systems.
7. Ensure access to affordable, reliable, sustainable, and modern energy for all.	According to the International Energy Agency, 940 million people lack access to electricity, and fossil fuels are the principal contributor to climate change.
8. Promote inclusive and sustainable economic growth, employment, and decent work for all.	The U.N. wants an increase in GDP per capita in developing countries of at least 7 percent per year. However, GDP per capita has declined in many countries as a result of the economic slowdown during the COVID-19 pandemic and subsequent recession.
9. Build resilient infrastructure, promote sustainable industrialization, and foster innovation.	In addition to electricity and sanitation issues cited in earlier goals, the U.N. also estimates that 1.5 billion people lack access to reliable phones.
10. Reduce inequality within and among countries.	Income inequality has increased since 1990 within and between countries. Refer to Figures 1-49, 1-50, and 9-15.
11. Make cities inclusive, safe, resilient, and sustainable.	Rapid urbanization has put pressure on water, sewerage, and health. The U.N. estimates that around 1 billion people live in what the U.N. defines as informal settlements. Refer to Chapter 13, Key Issue 3.
12. Ensure sustainable consumption and production patterns.	The U.N. estimates that 30 percent of food rots or spoils because of poor transportation or harvesting methods.
13. Take urgent action to combat climate change and its impacts.	It is not too late to reverse the recent sharp increase in carbon dioxide emissions that is producing climate change. Refer to Chapter 14, Key Issue 3.
14. Conserve and sustainably use the oceans, seas, and marine resources.	Progress has been made in water quality, but overfishing is a problem. Refer to Figure 10-57.
15. Sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss.	Drought, desertification, and deforestation are negatively impacting agriculture and biodiversity. Refer to Chapter 10, Key Issue 4.
16. Promote just, peaceful, and inclusive societies.	The U.N. estimates that corruption, bribery, theft, and tax evasion costs developing countries $2.6 trillion annually.
17. Revitalize the global partnership for sustainable development.	Before the start of the COVID-19 pandemic, aid increased from developed countries to developing countries, but it declined during the pandemic and subsequent worldwide recession.

Fair Trade

Learning Outcome 9.4.2 Explain principles of fair trade.

Fair trade has been proposed as a variation of the international trade model of development that promotes sustainability. **Fair trade** is international trade that provides greater equity to workers and small businesses in developing countries. Fair trade products are made and traded according to standards that protect workers, businesses, and consumers.

The fair trade movement focuses primarily on products exported from developing countries to developed countries. Sustainability is promoted by offering better trading and working conditions for producers and workers in developing countries. Fair trade organizations, backed by consumers, raise awareness of deficiencies in conventional international production and trade and the role of fair trade in improving economic, social, and environmental conditions for producers and workers.

Three sets of standards distinguish fair trade: One set applies to producers, a second set to workers on farms and in factories, and a third set to consumers, especially those living in developed countries.

▲ **FIGURE 9-55 FAIR TRADE TEXTILE FACTORY, TIRUPPUR, INDIA**

Fair Trade Producer Standards

Critics of international trade charge that only a tiny percentage of the price a consumer pays for a good reaches the individual in the developing country who is responsible for making or growing it. Someone in India sewing clothing for the U.S. market, for example, earns less than 1 percent of the retail price of the garment, according to the National Labor Committee (Figure 9-55). The rest goes to wholesalers, importers, distributors, advertisers, retailers, and others who did not actually make the item. In contrast, fair trade returns on average one-third of the price to the producer in the developing country.

Fair trade is a set of business practices designed to advance a number of economic, social, and environmental goals. International fair trade organizations set standards for implementing these principles, and they monitor, audit, and certify that practices comply with the standards. Fair trade production standards include:

- Raising the incomes of small-scale farmers and artisans by eliminating some of the middlemen.
- Distributing the profits and risks associated with production and sale of goods more fairly among producers, distributors, retailers, and financiers.
- Increasing the entrepreneurial and management skills of the producers.
- Promoting safe and sustainable farming methods and working conditions, such as by prohibiting the use of dangerous pesticides and herbicides and promoting the production of certified crops.

Fair Trade for Bihor

Local groups struggle to keep alive distinctive traditions through self-sufficiency. For example, for many generations women in Bihor, Romania, have practiced economic self-sufficiency in part by making distinctive clothing for their community's local consumption (Figure 9-56).

To design high-priced clothing for international consumption, big fashion houses get much of their inspiration from local traditions. Dior, one of the world's major fashion houses, created a copy of a Bihor coat and priced it at $40,000. The Bihor women fought back. With the help of a Romanian magazine, they made a video documenting Dior's plagiarism and established Bihor Couture to create and sell their locally made clothes at a fraction of the prices charged by Dior.

▲ **FIGURE 9-56 FAIR TRADE FOR SMALL-SCALE PRODUCERS** Distinctive clothing made in Bihor, Romania.

Fair Trade Worker Standards

Protection of workers' rights is not a high priority in the international trade development approach, according to its critics. They charge that:

- Oversight of workers' conditions by governments and international lending agencies is minimal.
- Workers allegedly work long hours in poor conditions for low pay.
- Children or forced labor may be in the workforce.
- Health problems may result from poor sanitation and injuries from inadequate safety precautions.
- Injured, ill, or laid-off workers are not compensated.

In contrast fair trade requires that workers be:

- Paid fair wages, at least enough to cover food, shelter, education, health care, and other basic needs.
- Permitted to organize a union and to have the right to collective bargaining.
- Protected by high environmental and safety standards.

Fair Trade & Customers

Most fair trade sales are in food, including coffee, tea, banana, chocolate, cocoa, juice, sugar, and honey products. In North America, fair trade products have been primarily craft products such as decorative home accessories, jewelry, textiles, and ceramics. Ten Thousand Villages is the largest fair trade organization in North America, specializing in handicrafts.

Buying fair trade products helps consumers connect more directly with the producers of the food, clothing, and household items that they buy. Fair trade products do not necessarily cost the consumer more than conventionally grown or produced alternatives. Because fair trade organizations bypass exploitative intermediaries and work directly with producers, they are able to cut costs and return a greater percentage of the retail price to the producers (Figure 9-57).

Cooperatives

Some small-scale farmers, artisans, and consumers join democratically managed cooperatives. A **cooperative** is an association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned enterprise (Figure 9-58). Cooperatives offer several advantages:

- The cooperative can qualify for credit so that funds can be borrowed to buy equipment and invest in improving farms.
- Materials can be purchased at a lower cost.
- The people who grow or make the products democratically manage allocation of resources and assure safe and healthy working conditions.
- Profits are reinvested in the community instead of going to absentee corporate owners.

Pause & Reflect 9.4.2 As a consumer in a developed country, what information do you need about a product to be confident it meets fair trade standards?

▲ **FIGURE 9-57 FAIR TRADE COFFEE**

▲ **FIGURE 9-58 COOPERATIVELY OWNED ORGANIC GROCERY STORE** Paris, France.

9 Summary & Review

KEY ISSUE

9.1 | Why Does Development Vary Among Countries?

- The Human Development Index (HDI) measures the level of development of each country.
- HDI is based on three factors: a decent standard of living, a long and healthy life, and access to knowledge.

KEY ISSUE

9.2 | Where Are Inequalities in Development Distributed?

- The inequality-adjusted HDI measures the extent of inequality in a country.
- The Gender Development Index (GDI) and the Gender Inequality Index (GII) measure the extent of inequality between men and women.

KEY ISSUE

9.3 | Why Do Countries Face Development Challenges?

- Two paths to development are self-sufficiency and international trade.
- International trade has been embraced by most countries in recent decades.
- Development is financed through foreign direct investment as well as loans from international organizations.

KEY ISSUE

9.4 | Why Are Countries Able to Make Progress in Development?

- Progress has been made in achieving development in most regions, but substantial gaps in performance between developed and developing countries persist.
- Fair trade is an alternative to the international trade model that provides greater equity to workers, small businesses, and consumers.

Thinking Geographically

KEY ISSUE

9.1 | Why Does Development Vary Among Countries?

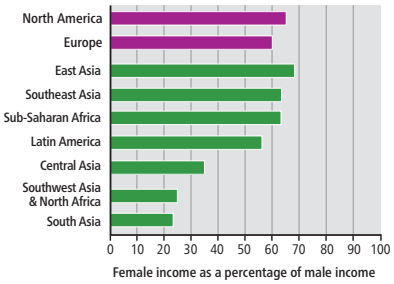
Which indexes of development presented in this chapter (HDI, IHDI, MPI, GDI, GII, or PHDI) do you think best measure a country's level of development? Which do you think are least successful at measuring a country's level of development? Why?

▲ **FIGURE 9CR-1 HOUSING UNDER CONSTRUCTION, ADDIS ABABA, ETHIOPIA**

KEY ISSUE

9.2 | Where Are Inequalities in Development Distributed?

Figure 9CR-2 shows female income as a percentage of male income by world region. What factors discussed in earlier chapters might be contributing to the high level of gender inequality in Southwest Asia & North Africa and in South Asia? Why?



▲ **FIGURE 9CR-2 FEMALE INCOME AS A PERCENTAGE OF MALE INCOME BY REGION**

KEY ISSUE

9.3 | Why Do Countries Face Development Challenges?

Although the international trade development path has proved more successful at promoting development, why have developed countries like the United States and the United Kingdom taken steps to reduce their commitment to international trade?

▲ **FIGURE 9CR-3 RALLY OPPOSING FREE TRADE** Brexit supporter.

KEY ISSUE

9.4 | Why Are Countries Able to Make Progress in Development?

Do you make purchase decisions on whether the producer or the shop promotes Fair Trade? Why or why not?

▲ **FIGURE 9CR-4 CO-OP GROCERY** Portland, Oregon.

Key Terms

Adolescent fertility rate The number of births per 1,000 women ages 15 to 19.

Cooperative An association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned enterprise.

Developed country A country that has progressed relatively far along a continuum of development.

Developing country A country that is at a relatively early stage in the process of development.

Development A process of improvement in the conditions of people through diffusion of knowledge and technology.

Fair trade A variation of international trade that provides greater equity to workers, small businesses, and consumers, focusing primarily on products exported from developing countries to developed countries.

Female labor force participation rate The percentage of women holding full-time jobs outside the home.

Foreign direct investment (FDI) Investment made by a foreign company in the economy of another country.

Gender Development Index (GDI) An indicator constructed by the U.N. to measure the gender gap in the level of achievement in terms of income, education, and life expectancy.

Gender Inequality Index (GII) An indicator constructed by the U.N. to measure the extent of each country's gender inequality in terms of reproductive health, empowerment, and the labor market.

Gender Social Norms Index (GSNI) An indicator constructed by the U.N. to measure the strength of attitudes biased against women.

Gross domestic product (GDP) The value of the total output of goods and services produced in a country in a year, excluding money that leaves and enters the country.

Gross national income (GNI) The value of the output of goods and services produced in a country in a year, including money that leaves and enters the country.

Gross national product (GNP) The value of the output of goods and services produced by the residents and businesses of a country in a year regardless of whether they are located in the country or abroad.

Human Development Index (HDI) An indicator constructed by the U.N. to measure the level of development for a country through a combination of income, education, and life expectancy.

Inequality-adjusted Human Development Index (IHDI) A modification of the HDI to account for inequality.

Literacy rate The percentage of a country's people who can read and write.

Microfinance Provision of small loans and financial services to individuals and small businesses in developing countries.

Millennium Development Goals Eight goals adopted by the U.N. in 2002 to reduce disparities between developed and developing countries by 2015.

Multidimensional Poverty Index (MPI) An index constructed by the U.N. that modifies the HDI to measure the complexities of the lives of people living in poverty.

Planetary pressures-adjusted Human Development Index (PHDI) An indicator constructed by the U.N. that modifies the HDI to account for a country's carbon dioxide emissions per person and the amount of raw materials extracted per person to meet the country's demand for goods and services.

Primary sector The portion of the economy concerned with the direct extraction of materials from Earth, principally through agriculture.

Productivity The value of a particular product compared to the amount of labor needed to make it.

Pupil/teacher ratio The number of enrolled students divided by the number of teachers.

Purchasing power parity (PPP) The amount of money needed in one country to purchase the same goods and services in another country.

Quaternary sector The portion of the economy concerned with information- and knowledge-based services.

Quinary sector The portion of the economy concerned with human services and hospitality.

Secondary sector The portion of the economy concerned with manufacturing useful products through processing, transforming, and assembling raw materials.

Structural adjustment program Economic reforms that a developing country must adopt in order to secure financial support from the IMF, the World Bank, or a developed country.

Sustainable Development Goals Seventeen goals adopted by the U.N. in 2015 to reduce disparities between developed and developing countries by 2030.

Tertiary sector The portion of the economy concerned with the provision of goods and services to people in exchange for payment.

World-systems theory A theory developed by Immanuel Wallerstein that in an increasingly unified world economy developed countries form an inner core area whereas developing countries are found on the periphery and semi-periphery.

International Geographic Mapping Explorations

Gender Inequality in India

Gender inequality is an important obstacle to improving a country's level of development. The U.N. measures gender inequality in several ways. These measures can help identify obstacles to development for India, a country classified by the U.N. as medium developing. Based on the U.N.'s GDI, GII, and GSNI indexes, four obstacles to gender equality in India—economic, educational, political, or health—can be ranked from the most to the least impactful on India's level of development.

FIGURE 9CR-5 SCHOOL, VRINDĀVAN, INDIA

. . . . Development involves a process of enlarging people's ability to lead a long and healthy life, to acquire knowledge, and to have access to resources needed for a decent standard of living. To lead a long a healthy life, everyone needs food, but people consume different amounts and types of food, and they obtain food in different ways, as we will see in the next chapter, Food & Agriculture. . . .

10 Food & Agriculture

KEY ISSUES

10.1 Why Do People Consume Distinctive Foods?

People consume a wide variety of food, depending on their income, physical environment, and cultural preferences. The U.N. estimates that 9 percent of the world's people are undernourished.

10.2 Where Did Agriculture Originate?

Agriculture was invented around 10,000 years ago in multiple places. Prior to the agricultural revolution, people survived by hunting and gathering their food.

10.3 Where Is Agriculture Distributed?

The world can be divided into 11 principal agricultural regions, including five that are important in developing countries and six in developed countries.

10.4 Why Do Farmers Face Sustainability Challenges?

Globally, food production and trade have increased to meet the needs of a growing population. The environmental impacts of increasing food production are debated.

▶ Market, Ruteng, Indonesia.

All humans need food to survive. We have two choices in obtaining our food: buy it from others or produce it ourselves. For most of human history, people had to search out their food. Around 10,000 years ago, humans figured out how to deliberately grow their own food. In the modern world, most people buy their food.

With greater separation between the production of food and the consumption of it, humans are less aware of the connections between their food choices and impacts on the physical environment. People may also be less aware of the connections between their food choices and the businesses that grow and distribute the food.

LOCATIONS EXPLORED IN THIS CHAPTER

KEY ISSUE

10.1 | Why Do People Consume Distinctive Foods?

When you buy food in a supermarket, are you reminded of a farm? Not likely. The meat is carved into pieces that no longer resemble an animal and is wrapped in paper or plastic film. Often the vegetables are canned or frozen. The milk and eggs are in cartons. Yet all the foods we eat—whether plant or animal—must first be grown or raised on a farm or ranch or harvested from the natural environment.

Food, Agriculture, & Geography

Learning Outcome 10.1.1 Explain differences between developed and developing countries in food consumption.

Everyone needs food to survive. Consumption of food varies around the world, in both total amount and source of nutrients. The variation results from a combination of:

- **Level of development.** People in developed countries tend to consume more food and from different sources than do people in developing countries.
- **Physical conditions.** Climate is important in influencing what can be most easily grown and therefore consumed in developing countries. In developed countries, though, food is shipped long distances from locations with different climates.
- **Cultural preferences.** Some food preferences and avoidances can best be explained as expressions of culture rather than the result of physical and economic factors, as discussed in Chapter 4.

A sharp contrast in agricultural practices constitutes one of the most fundamental differences between the developed countries and developing countries of the world. The most "typical" human – if there is such a person – is an Asian farmer who grows enough food to survive with little surplus. The mechanized, highly productive American or Canadian farm contrasts with the subsistence farm found in much of the world.

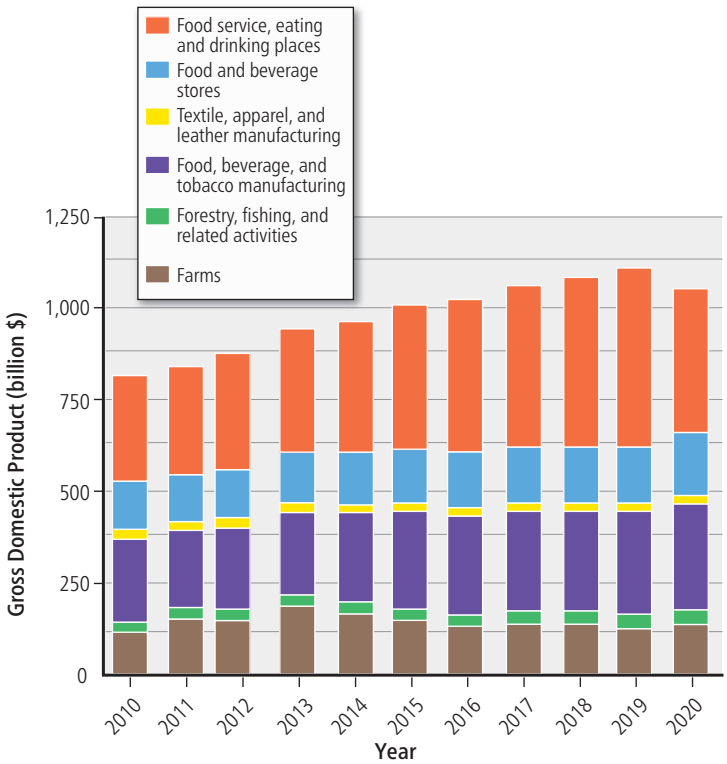
The food industry in the United States and Canada is vast, but only a few people in the two countries are full-time farmers. Instead, the vast majority of the workers in the U.S. and Canadian food industries may be more familiar with the operation of computers and advanced machinery than the typical factory or office worker. In fact, North American farmers are part of a complex chain of distributors, manufacturers, and retailers that stand between the growers of food and the consumers of food.

The U.S. Food & Agriculture Industry

The food and agriculture industry contributes around 5 percent of the U.S. gross domestic product (GDP). Only one-tenth of the food and agriculture contribution comes from actually growing the food that Americans eat (Figure 10-1). Less than 3 million people are farmers in the United States, accounting for only around 1 percent of all U.S. jobs. The remainder of the contribution comes from manufacturing the food, selling it in stores, and serving it in restaurants and bars.

Food service jobs, including eating and drinking places, account for 11 million jobs in the United States, or 5.5 percent of all jobs in the country. Around 2 percent of U.S. jobs are in stores that sell food and beverages and around 1 percent are jobs that manufacture food and beverages. Manufacturers have accounted for an increasing share of the food and agriculture industry's contribution to the U.S. economy. The five largest food manufacturers operating in the United States are PepsiCo, Tyson Foods, JBS, Nestlé, and Kraft Heinz. PepsiCo generates most of its revenue from its cola and Frito-Lay divisions. Tyson Foods is the leading U.S. manufacturer of chicken products. JBS is a Brazilian company that owns a substantial share of the U.S. meat-processing industry, including Swift. Nestlé, which is based in Switzerland, is the world's largest food manufacturer. Kraft Heinz makes products such as Velveeta cheese and Oscar Meyer hot dogs.

More than half of the jobs related to food and agriculture are in restaurants and bars. Food service jobs increased rapidly during the 2010s, until the onset of the COVID-19 pandemic in 2020 forced many restaurants and bars to close either temporarily or permanently.



▲ **FIGURE 10-1 CONTRIBUTION OF FOOD AND AGRICULTURE TO U.S. ECONOMY, 2010–2020** Figures are value added to U.S. GDP.

How Much We Eat

The amount of food that an individual consumes is **dietary energy consumption**. The unit of measurement of dietary energy is the kilocalorie (kcal), or Calorie in the United States. One gram (or ounce) of each food source delivers a kilocalorie level that nutritionists can measure.

To maintain a moderate level of physical activity, according to the United Nations Food and Agricultural Organization, an average individual needs to consume on a daily basis around 1,800 kcal. Average consumption worldwide is around 3,000 kcal per day, well above the recommended minimum. Thus, most people get enough food to survive (Figure 10-2). However, the average daily kcal consumption in sub-Saharan Africa is only 2,400, an indication that a large percentage of Africans are eating far less than that a day and therefore not getting enough to eat.

Underconsumption & Overconsumption

Diets can be deficient in nutrients, a condition called *malnutrition*, and populations in both developed and developing countries are affected by the condition. The malnutrition could be due to insufficient consumption of nutritious food or excessive consumption of food of minimal nutritional value.

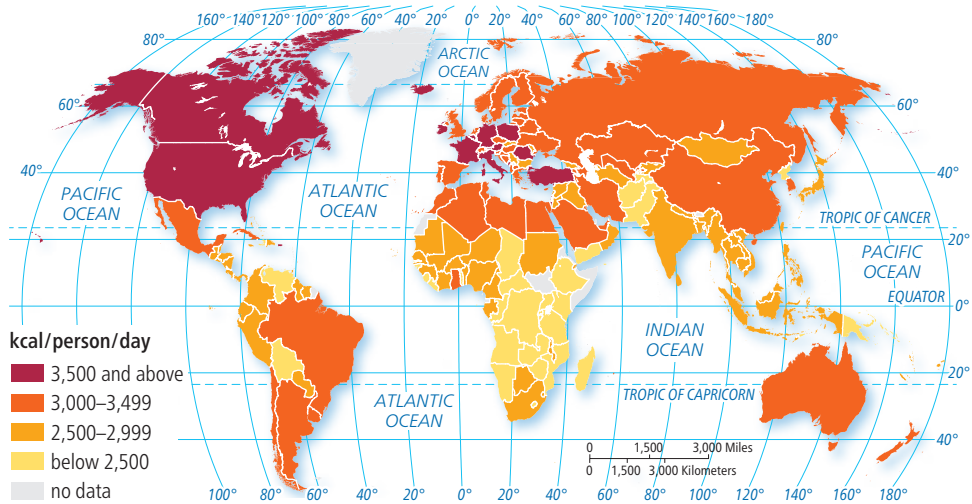
Undernourishment. The U.N. defines **food security** as physical, social, and economic access at all times to safe and nutritious food sufficient to meet dietary needs and food preferences for an active and healthy life. By this definition, around 10 percent of the world's inhabitants do not have food security. A level of dietary energy consumption that is continuously below that needed for a healthy life and carrying out light physical activity is called **undernourishment**. The U.N. estimates that 9 percent of the world's people—approximately 828 million people—are undernourished, one-third of them in India and China, the world's two most populous countries. Overall, 98 percent of the world's undernourished people are in developing countries.

As a percentage of a country's population, undernourishment is most prevalent in sub-Saharan Africa and South Asia. The U.N. estimates that 23 percent of the population in sub-Saharan Africa and 17 percent of the population in South Asia are undernourished.

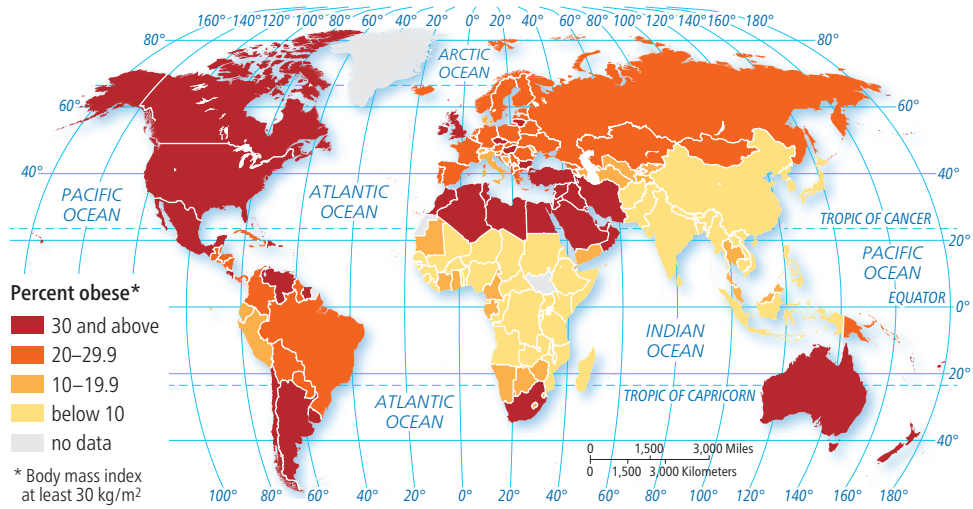
The world as a whole has made progress in reducing hunger during the twenty-first century. Between 2000 and 2021, the number of undernourished people remained virtually unchanged, while the percentage of people who were undernourished declined from 13 percent in 2000 to 9 percent in 2021. Asia and Southeast Asia have had the largest decreases in the number and percentage undernourished.

Obesity. The overconsumption of food is a major health concern in developed countries. The average American is consuming 3,800 kcal per day, the world's highest level and more than twice the recommended minimum. Obesity is more prevalent than hunger in the United States as well as in other developed countries (Figure 10-3).

Pause & Reflect 10.1.1 What reasons might account for the fact that more Americans suffer from obesity than from underconsumption of food?



▲ **FIGURE 10-2 DIETARY ENERGY CONSUMPTION** Average consumption is below or slightly above minimum needs in much of sub-Saharan Africa.
Source: U.N. FAO



▲ **FIGURE 10-3 DISTRIBUTION OF OBESITY** North America is the region with the highest share of obese people.

What We Eat

Learning Outcome 10.1.2
Explain differences between developed and developing countries in their principal sources of nutrients.

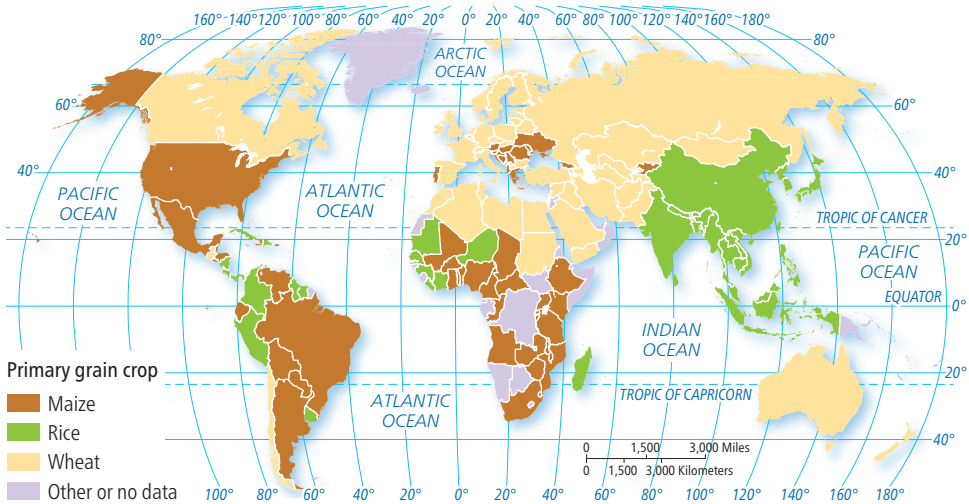
Most humans derive most of their kilocalories through consumption of **cereal grain** (or simply cereal), which is a grass that yields grain for food. **Grain** is the seed from a cereal grass.

Cereal Grains

The three leading cereal grains are wheat, maize (corn in North America), and rice. These three cereal grains together account for nearly 90 percent of all grain production and more than 40 percent of all dietary energy consumed worldwide (Figure 10-4). Wheat is the most consumed cereal grain in North America, Europe, and Southwest Asia & North Africa. Rice is the most consumed cereal grain in most of Asia. Maize is the most consumed cereal grain in Central America and in eastern and southern Africa (Figure 10-5).

Meat Consumption

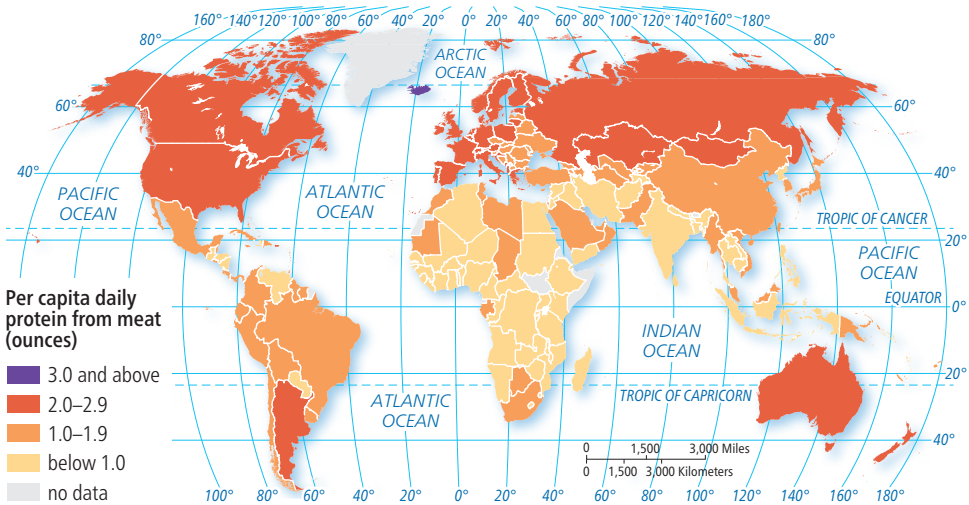
Protein is a nutrient needed for growth and maintenance of the human body. Many food sources provide protein of varying quantity and quality. One of the most fundamental differences between developed and developing regions is the primary source of protein. In developed countries, the leading source of protein is meat products, including beef, pork, and poultry. Consumption of protein from meat exceeds 3 ounces per person per day in Europe, the United States, and Australia, compared with less than 1 ounce per day in many countries of South Asia and sub-Saharan Africa (Figure 10-6).



▲ **FIGURE 10-4 GRAIN PRODUCTION** Wheat, rice, and maize (corn) are the three main sources of kilocalories.

(a) (b) (c)

▲ **FIGURE 10-5 TYPICAL FOOD IN ZIMBABWE** (a) Maize (corn) is the most commonly grown crop and food source in Zimbabwe. (b) Maize is cooked into a thick porridge known as sadza in Zimbabwe. (c) Sadza is typically eaten in Zimbabwe mixed with tomatoes, onions, and chicken or local greens.



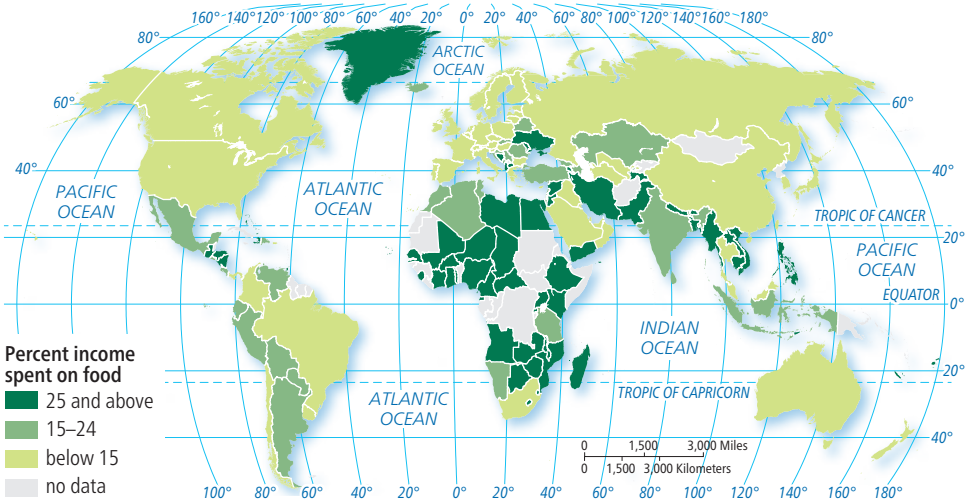
▲ **FIGURE 10-6 PROTEIN FROM MEAT**

Food Prices

The greatest challenge to world food security in the twenty-first century has been food prices rather than food supply. People on average spend less than 15 percent of their income on food in developed countries, compared with more than 25 percent in much of Africa (Figure 10-7).

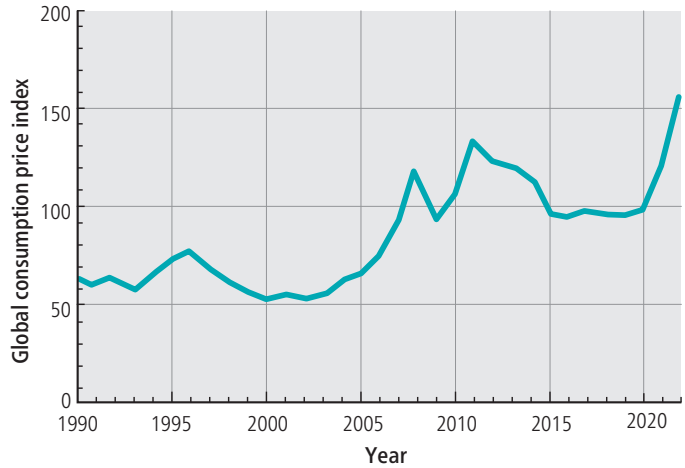
Food prices were at a record high in 2022 (Figure 10-8). Four factors have been especially important in explaining the record-high food prices:

- Worldwide, consumption of food has been increasing more rapidly than production of food, especially in Asia.
- Growers and manufacturers of food have faced higher prices for fuel (especially oil and natural gas) and fertilizer (which is often made from natural gas).
- The COVID-19 pandemic disrupted long-standing patterns of distribution of supplies needed to produce and distribute food.
- Russia's attack on Ukraine sharply reduced supplies of some food. Before the war, both countries were major food exporters, especially of wheat (refer to Figure 10-61); Ukraine was prevented by Russia from shipping much of its wheat, and other countries boycotted Russian products, including wheat.

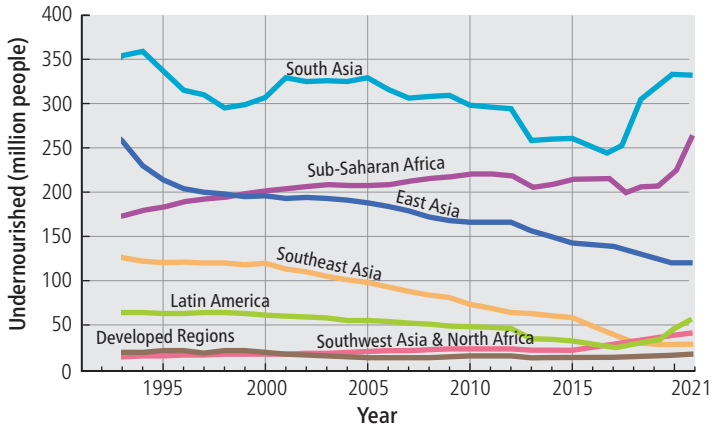


▲ **FIGURE 10-7 INCOME SPENT ON FOOD**

▶ **FIGURE 10-8 GLOBAL FOOD PRICE INDEX**
Worldwide food prices have more than doubled since 2000.
Source: U.N. FAO



▶ **FIGURE 10-9 CHANGE IN UNDERNOURISHMENT**



Food Waste

Higher prices and disrupted distribution resulted in an increase in undernourishment, especially in sub-Saharan Africa (Figure 10-9). Given the large number of undernourished people there are in the world, especially challenging for worldwide food security is the amount of food that is wasted. The U.N. reports that 17 percent of food produced globally is discarded. People in their homes account for 61 percent of food waste, food service 26 percent, and grocery retailers 13 percent, according to the U.N. (Figure 10-10).

▼ **FIGURE 10-10 FOOD WASTE**

Pause & Reflect 10.1.2 Do an internet search for information about the protein content of cereal grains. How do wheat, rice, and maize compare with other grains or with an equivalent serving of meat? Have you tried any of the less well-known cereal grains?

KEY ISSUE

10.2 | Where Did Agriculture Originate?

Humans obtain their food either directly or indirectly through **agriculture**, which is obtaining sustenance or economic gain by the deliberate modification of Earth's surface for the cultivation of plants and the rearing of animals. The word *cultivate* means "to care for," and a **crop** is any plant cultivated by people. Land suitable for agriculture was defined in Chapter 2 as *arable land*.

The First Agricultural Revolution

Learning Outcome 10.2.1 Summarize the origin of agriculture.

Agriculture originated when humans learned to domesticate plants and animals for their use. The origin of agriculture cannot be documented with certainty because it began before recorded history. Scholars try to reconstruct a logical sequence of events based on fragments of information about ancient agricultural practices and historical environmental conditions. Improvements in cultivating plants and domesticating animals evolved over thousands of years. This section offers an explanation for the origin and diffusion of agriculture.

Hunters & Gatherers

Before the invention of agriculture, all humans probably obtained the food they needed for survival through hunting for animals, fishing, or gathering plants (such as berries, nuts, fruits, and roots). Hunters and gatherers lived in small groups of usually fewer than 50 persons because a larger number would quickly exhaust the available resources within walking distance.

These groups traveled frequently, establishing new home bases or camps. The direction and frequency of migration depended on the movement of game and the seasonal growth of plants at various locations. We can assume that groups communicated with each other concerning matters such as hunting rights and intermarriage. For the most part, they kept the peace by steering clear of each other's territory. A group collected food often, perhaps daily. The amount of time needed for each day's food search varied, depending on local conditions. The men hunted game or fished, and the women collected berries, nuts, and roots. This gendered division of labor sounds like a stereotype but is based on evidence from archaeology and anthropology.

Today, perhaps a quarter-million people, or less than 0.005 percent of the world's population, still survive by hunting and gathering rather than by agriculture. Contemporary hunting and gathering societies are isolated groups that live on the periphery of world settlement, but they provide insight into human customs that prevailed in prehistoric times, before the invention of agriculture (Figure 10-11).

▲ **FIGURE 10-11 HUNTING & GATHERING** San people, Botswana.

Origins of the First Agricultural Revolution

The process that began when human beings first domesticated plants and animals and no longer relied entirely on hunting and gathering became known as the **first agricultural revolution**. Geographers and other scientists believe that the first agricultural revolution occurred around the year 8000 B.C.E. because the world's population began to grow at a more rapid rate than it had in the past. By growing plants and raising animals, human beings created larger and more stable sources of food, so more people could survive.

Scientists do not agree on whether the first agricultural revolution originated primarily because of environmental factors or cultural factors. Probably a combination of both factors contributed.

Environmental Factors. The first domestication of crops and animals coincided with climate change that marked the end of the last ice age. At that time, permanent ice cover receded from Earth's mid-latitudes to the polar regions, resulting in a massive redistribution of humans, other animals, and plants.

Cultural Factors. A preference for living in a fixed place rather than as nomads may have led hunters and gatherers to build permanent settlements and to store surplus vegetation there. In gathering wild vegetation, people inevitably cut plants and dropped berries, fruits, and seeds. These hunters probably observed that, over time, damaged or discarded food produced new plants. They may have deliberately cut plants or dropped berries on the ground to see if they would produce new plants. Subsequent generations learned to pour water over the site and to introduce manure and other soil improvements. Over thousands of years, plant cultivation apparently evolved from a combination of observation and experiment into a deliberate process.

Agricultural Hearths

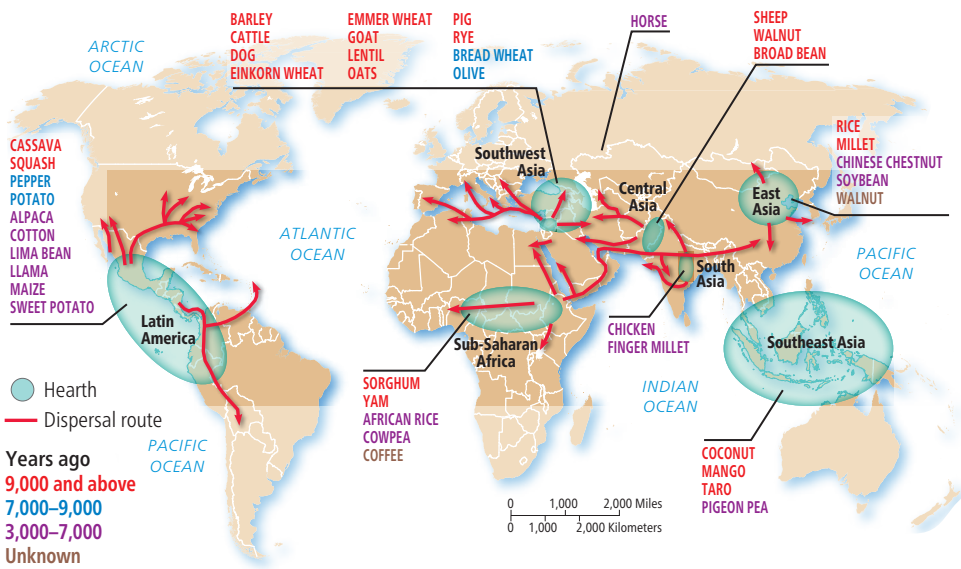
Scientists agree that agriculture originated in multiple hearths around the world: Southwest Asia, East Asia, sub-Saharan Africa, and Latin America (Figure 10-12). Even within these hearths, scientists have determined that agriculture was invented independently by multiple groups.

- **Southwest Asia.** The earliest crops domesticated in Southwest Asia around 10,000 years ago are thought to have been barley, wheat, lentil, and olive crops. The region may have been the hearth for the domestication of many animals, including cattle, goats, pigs, sheep, and dogs. From this hearth, cultivation diffused west to Europe and east to Central Asia.
- **East Asia.** Rice is now thought to have been domesticated in East Asia more than 10,000 years ago, along the Yangtze River in eastern China. Millet was cultivated at an early date along the Huang He (Yellow) River.
- **Central & South Asia.** Chickens are thought to have diffused from South Asia around 4,000 years ago. The horse is considered to have been domesticated in Central Asia. Diffusion of the domesticated horse is thought to be associated with the diffusion of the Indo-European language, as discussed in Chapter 5.
- **Sub-Saharan Africa.** Sorghum was domesticated in central Africa around 8,000 B.C.E. Yams may have been domesticated even earlier.
- **Latin America.** Two important hearths of crop domestication are thought to have emerged in Mexico and Peru around 4,000 to 5,000 B.C.E. Mexico is considered a hearth for beans and cotton, and Peru for potato.

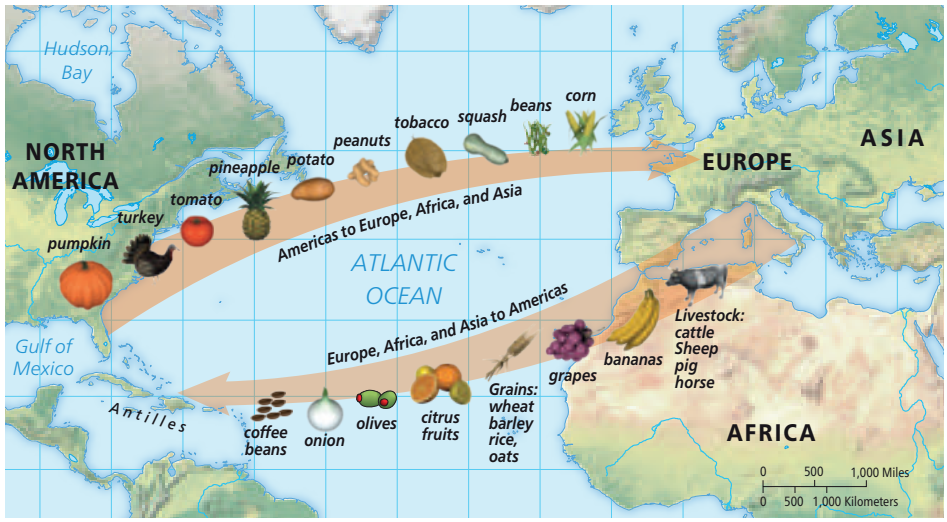
Diffusion of Agriculture

That agriculture had multiple origins means, from the earliest times of human existence, people have produced food in distinctive ways in different regions. This diversity derives from a unique legacy of wild plants, climatic conditions, and cultural preferences in each region. Improved communications in recent centuries have encouraged the diffusion of some plants to varied locations around the world. Many plants and animals thrive across a wide portion of Earth's surface, not just in their place of original domestication. It wasn't until the sixteenth century, for example, that wheat, oats, and barley were introduced to the Western Hemisphere and maize to the Eastern Hemisphere. The transfer of plants and animals, as well as people, culture, and technology, between the Western Hemisphere and Europe, as a result of European colonialization and trade, is known as the **Columbian Exchange** (Figure 10-13).

Pause & Reflect 10.2.1 Did crops diffuse primarily in an east-west pattern or a south-to-north pattern? Why?



▲ **FIGURE 10-12 AGRICULTURE HEARTHS AND DISPERSAL ROUTES**



▲ **FIGURE 10-13 COLUMBIAN EXCHANGE**

The Second & Third Agricultural Revolutions

Learning Outcome 10.2.2 Describe how farmers and scientists have achieved productivity increases.

Population growth beginning in the eighteenth century associated with stage 2 of the demographic transition generated fear that an increasing in food supply would not keep pace with an increase in population. As discussed in Chapter 2, Thomas Malthus's *An Essay on the Principle of Population*, published in 1798, argued that population increased geometrically, whereas food supply increased arithmetically (refer to Figure 2-64).

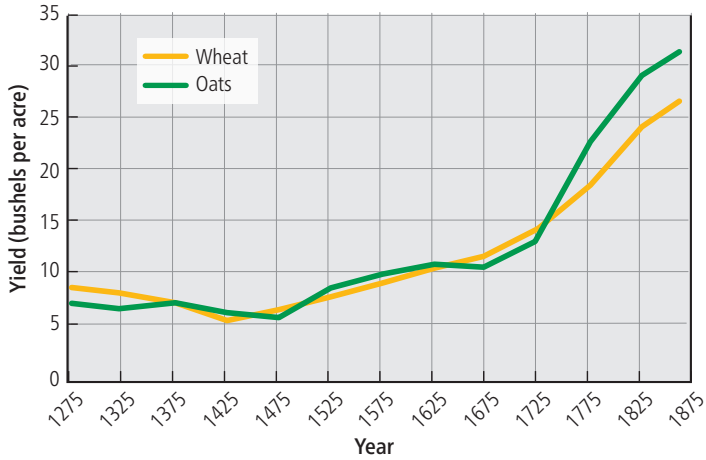
The Second Agricultural Revolution

Malthus's dire predictions did not come true, thanks in part to the second agricultural revolution, which began in the United Kingdom in the seventeenth century. The **second agricultural revolution** increased productivity, through such practices as improved crop rotation and livestock breeding, resulting in an expansion of the food supply. New agricultural practices have permitted farmers worldwide to achieve much greater yields from the same amount of land as they had before the advancements. Increased agricultural productivity associated with the second agricultural revolution helped feed the rapidly growing population in countries in stage 2 of the demographic transition during the nineteenth century in developed countries and during the twentieth century in developing countries.

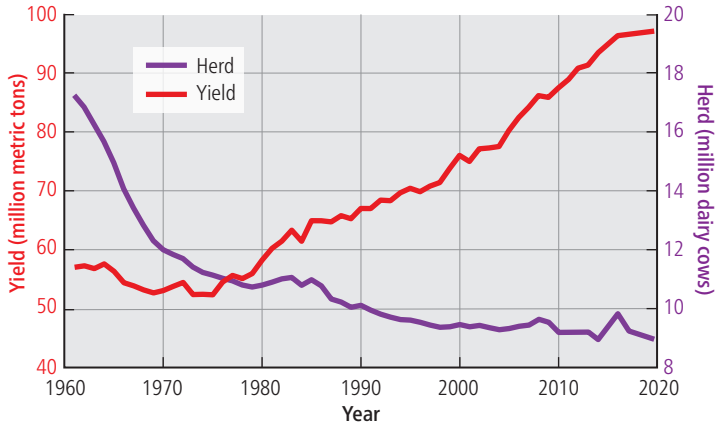
The Second Agricultural Revolution in Developed Countries. The second agricultural revolution is also known as the British agricultural revolution because many of the inventions and new practices occurred there first. Not by coincidence, the British agricultural revolution in the seventeenth and eighteenth centuries was an important factor that enabled Britain to become the first country to enter stage 2 of the demographic transition in the nineteenth century. For example, the amount of wheat and oats that British farmers were able to grow from an acre of land, which had remained virtually unchanged for many centuries, doubled during the eighteenth century (Figure 10-14).

The experience of dairy farming in the United States demonstrates the growth in productivity. The number of dairy cows in the United States decreased from 10.8 million to 9.4 million between 1980 and 2021. But milk production increased from 58 to 101 million metric tons. Thus, yield per cow increased 93 percent during this 41-year period, from 5.4 to 10.8 metric tons per cow (Figure 10-15).

The Second Agricultural Revolution in Developing Countries. Rapid population growth in developing countries beginning in the late twentieth century compelled farmers to consider new farming approaches that produce enough food to take care of the additional people. Economist Ester Boserup has found that farmers in developing increase the supply of food through intensification of production,



▲ **FIGURE 10-14 SECOND AGRICULTURAL REVOLUTION IN BRITAIN** The amount of crops, such as wheat and oats, that British farmers were able to grow on a parcel of land doubled during the eighteenth century.



▲ **FIGURE 10-15 U.S. DAIRY PRODUCTIVITY** The amount of milk produced per cow has increased rapidly in the United States, especially since the 1980s.

achieved in two ways. First, new farming methods are adopted. Plows replace axes and sticks. More weeding is done, more manure is applied, more terraces are carved out of hillsides, and more irrigation ditches are dug. The additional labor needed to perform these operations comes from the population growth. The farmland yields more food per area of land, but with the growing population, output per person remains about the same.

Second, land is left fallow for shorter periods. Boserup identified five stages in the reduction of fallow farmland:

1. **Forest fallow.** Fields are cleared and utilized for up to two years and left fallow for more than 20 years, long enough for the forest to grow back.
2. **Bush fallow.** Fields are cleared and utilized for up to 8 years and left fallow for up to 10 years, long enough for small trees and bushes to grow back.
3. **Short fallow.** Fields are cleared and utilized for perhaps two years and left fallow for up to two years, long enough for wild grasses to grow back.
4. **Annual cropping.** Fields are utilized every year and rotated between legumes and roots.
5. **Multi-cropping.** Fields are utilized several times a year and never left fallow.

Third Agricultural Revolution

Population grew at the fastest rate in human history during the second half of the twentieth century, again generating dire predictions of imminent global famine. As with the second agricultural revolution two centuries earlier, productivity improvements in the late twentieth century again resulted in agricultural output expanding more rapidly than population. The invention and rapid diffusion of more productive agricultural techniques during the second half of the twentieth century is called the **green revolution**, or the **third agricultural revolution**.

The green revolution involves two main practices: the introduction of new higher-yield seeds and the expanded use of fertilizers. Because of the green revolution, agricultural productivity at a global scale has increased faster than population growth. Scientists began an intensive series of experiments during the 1950s to develop a higher-yield form of wheat. A decade later, the "miracle wheat seed" was ready. Shorter and stiffer than traditional breeds, the new wheat was less sensitive to variation in day length, responded better to fertilizers, and matured faster. The Rockefeller and Ford foundations sponsored many of the wheat studies, and the program's director, Dr. Norman Borlaug, won the Nobel Peace Prize in 1970 for his contributions to the green revolution and the fight against world hunger.

The International Rice Research Institute, established in the Philippines by the Rockefeller and Ford foundations, worked to create a miracle rice seed (Figure 10-16). During the 1960s, their scientists introduced a hybrid of Indonesian rice and Taiwan dwarf rice that was hardier and that increased yields (Figure 10-17). More recently, scientists have developed new high-yield maize (corn).

The new miracle seeds diffused rapidly around the world. India's wheat production, for example, more than doubled in five years. After importing 10 million tons of wheat annually in the mid-1960s, India had a surplus of several million tons by 1971. Other Asian and Latin American countries recorded similar productivity increases. The green revolution was largely responsible for preventing a food crisis in these regions during the 1970s and 1980s. But will these scientific breakthroughs continue in the twenty-first century?

▼ **FIGURE 10-16 TESTING NEW VARIETIES OF RICE** "Miracle" high-yield seeds have been produced through laboratory experiments at the International Rice Research Institute (IRRI), Los Baños, Philippines. The IRRI is testing varieties in the Philippines.

▲ **FIGURE 10-17 MIRACLE RICE** Ordinary rice (left) and miracle rice (right) at the IRRI.

To take full advantage of the new miracle seeds, farmers must use more fertilizer and machinery. Farmers have known for thousands of years that application of manure, bones, and ashes somehow increases, or at least maintains, the fertility of the land. Not until the nineteenth century did scientists identify nitrogen, phosphorus, and potassium (potash) as the critical elements in these substances that improve land fertility. Today these three elements form the basis for fertilizers – products that farmers apply to their fields to enrich the soil by restoring lost nutrients.

Nitrogen, the most important fertilizer, is a ubiquitous substance. China is the leading producer of nitrogen fertilizer. Europeans most commonly produce a fertilizer known as urea, which contains 46 percent nitrogen. In North America, nitrogen is available as ammonia gas, which is 82 percent nitrogen but more awkward than urea to transport and store. Both urea and ammonia gas combine nitrogen and hydrogen. The problem is that the cheapest way to produce both types of nitrogen-based fertilizers is to obtain hydrogen from natural gas or petroleum. When fossil fuel prices increase, so do the prices for nitrogen-based fertilizers, which then become too expensive for many farmers in developing countries.

In contrast to nitrogen, phosphorus and potash reserves are not distributed uniformly across Earth's surface. Phosphate rock reserves are clustered in China, Morocco, and the United States. Proven potash reserves are concentrated in Canada and Belarus.

Farmers need tractors, irrigation pumps, and other machinery to make the most effective use of the new miracle seeds. In developing countries, farmers cannot afford such equipment and cannot, in view of high energy costs, buy fuel to operate the equipment. To maintain the green revolution, governments in developing countries must allocate scarce funds to subsidize the cost of seeds, fertilizers, and machinery.

Pause & Reflect 10.2.2 How do increases in energy prices impact farming, including land preparation, seed sowing, plant irrigation and fertilization, and crop yield and distribution?

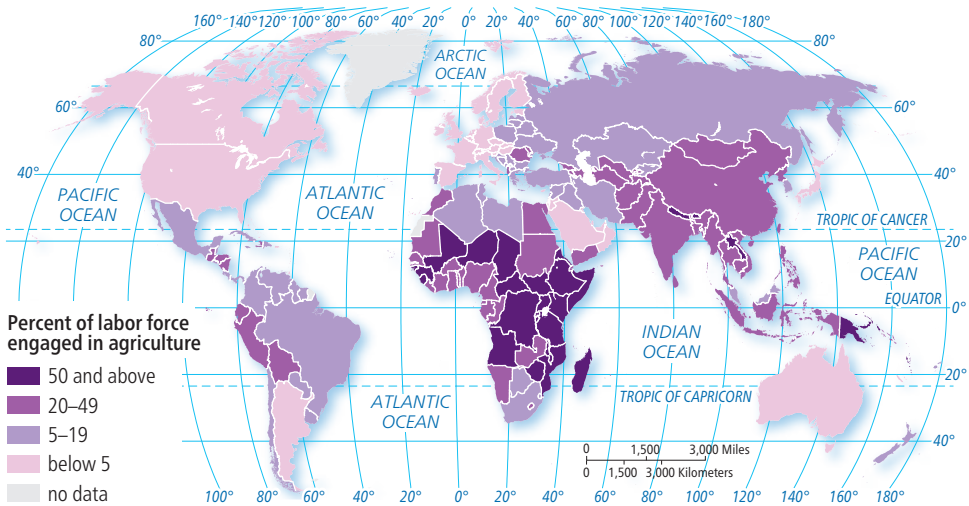
Subsistence & Commercial Agriculture

Learning Outcome 10.2.3 Describe the principal differences between subsistence and commercial agriculture.

The most fundamental differences in agricultural practices are between those in developing countries and those in developed countries. Farmers in developing countries generally practice subsistence agriculture, whereas farmers in developed countries practice commercial agriculture.

Subsistence agriculture, found in developing countries, is the production of food primarily for consumption by the farmer's family. **Commercial agriculture**, found in developed countries, is the production of cash crops primarily for sale off the farm. A **cash crop** is one that is grown for sale rather than for the farmer's own use. The main features that distinguish commercial agriculture from subsistence agriculture include the percentage of farmers in the labor force, the use of machinery, and farm size.

▲ **FIGURE 10-18 AGRICULTURAL WORKERS IN A DEVELOPING COUNTRY** Harvesting wheat, Yozgat, Türkiye.



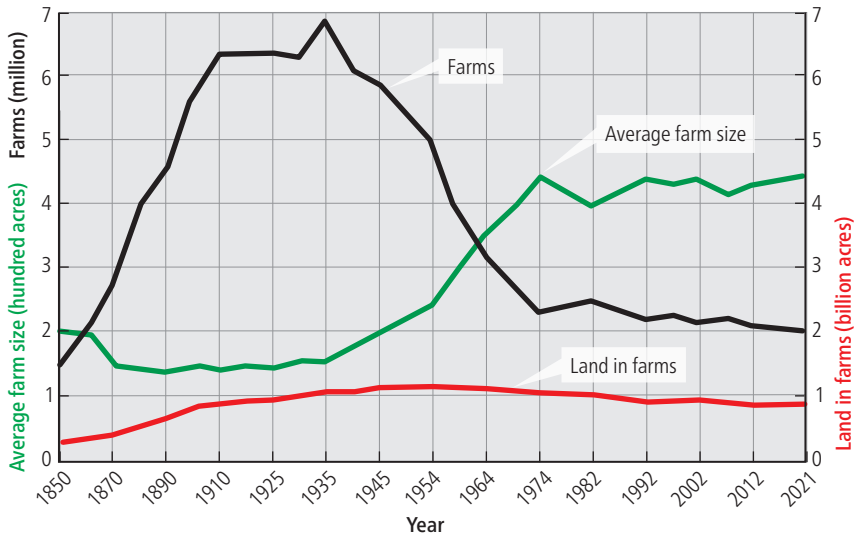
▲ **FIGURE 10-19 AGRICULTURAL WORKERS** The percentage of the workforce engaged in agriculture is much higher in developing countries with subsistence agriculture than in developed countries with commercial agriculture.
Source: World Bank

Farmers: Fewer Grow More

All people must secure food in order to survive. In developing countries, a large percentage of people are subsistence farmers who work in agriculture to produce the food they and their families require. In developed countries relatively few people are engaged in farming, and most people buy food with money earned by working in factories or offices or by performing other services.

In developed countries, around 3 percent of workers are engaged directly in farming, compared to around 35 percent in developing countries (Figure 10-18). The percentage of farmers is even lower in North America – only around 1 percent (Figure 10-19). Yet the small percentage of farmers in the United States and Canada produces not only enough food for themselves and the rest of the region but also a surplus to feed people elsewhere.

The number of farms declined dramatically in the United States, from 7 million in 1935 to 4 million in 1955 and 2 million in 2021. Both push and pull migration factors have been responsible for the decline: Farmers were pushed away from farms by lack of opportunity to earn a decent income, and at the same time, they were pulled to higher-paying jobs in urban areas (Figure 10-20).



▲ **FIGURE 10-20 U.S. FARMS** The number of farms has declined sharply, but the average size of farms has increased.
Source: U.S. Department of Agriculture

Technology: Agriculture's Game Changer

In developed countries, a small number of commercial farmers can feed many people because they rely on machinery to perform work rather than on people or animals. In developing countries, subsistence farmers do much of the work with hand-tools and animal power.

Traditionally, the farmer or local craftspeople made equipment from wood, but beginning in the late eighteenth century, factories produced farm machinery. The first all-iron plow was made in the 1770s and was followed in the nineteenth and twentieth centuries by inventions that made farming less dependent on human or animal power. Today, farmers use tractors, combines, corn pickers, planters, and other factory-made farm machines to increase productivity.

Experiments conducted in university laboratories, industry, and research organizations generate new fertilizers, herbicides, hybrid plants, animal breeds, and farming practices, which lead to higher crop yields and healthier animals. Access to other scientific information has enabled farmers to make more intelligent decisions concerning proper agricultural practices. Some farmers conduct their own on-farm research.

Electronics also help commercial farmers. Farmers use Global Positioning System (GPS) devices to determine the precise coordinates for planting seeds and for spreading different types and amounts of fertilizers. On large ranches, they also use GPS devices to monitor the locations of cattle and tractors. They use satellite imagery to measure crop progress and yield monitors attached to combines to determine the precise number of bushels being harvested. Drones are available to irrigate the fields (Figure 10-21).

Farm Size: Is Bigger Better?

In commercial agriculture, the average farm is relatively large (Figure 10-22). Farms average 180 hectares (445 acres) in the United States, compared to about 1 hectare (2.5 acres) in South Asia. Farm size partly depends on mechanization (Figure 10-23). Combines, pickers, and other machinery perform most efficiently at very large scales, and their considerable expense cannot be justified on a small farm. As a result of the large size and the high level of mechanization, commercial agriculture is an expensive business. Farmers spend hundreds of thousands of dollars to buy or rent land and machinery before beginning operations. This money is frequently borrowed from a bank and repaid after output is sold.

▲ **FIGURE 10-21 A DRONE IRRIGATES A U.S. FARM FIELD**

▲ **FIGURE 10-22 FARM SIZE** This satellite image displays around 110 hectares, around two-thirds the size of an average farm in the United States. The average farm in South Asia (around 1 hectare) is approximately the size of the small square on the right edge of the image.

Commercial agriculture is increasingly dominated by a handful of large farms. In the United States, the largest 3 percent of farms produce 47 percent of the country's total agriculture. Despite their size, most commercial farms in developed countries – 99 percent in the United States – are family owned and operated. Commercial farmers frequently expand their holdings by renting nearby fields.

Although the United States had fewer farms and farmers in 2020 than in 1900, the average size of the country's farms has increased sharply. The amount of land devoted to agriculture increased by 13 percent during the twentieth century, primarily due to irrigation and reclamation. However, in the twenty-first century, the United States has been losing 400,000 hectares (1 million acres) per year of its 362 million hectares (895 million acres) of farmland, primarily because of the expansion of urban areas.

Pause & Reflect 10.2.3 What combination of factors explains the relatively small number of farmers in developed countries?

▼ **FIGURE 10-23 LACK OF MECHANIZATION** Demonstrating the use of a row-scoring rake, Bihar, India.

KEY ISSUE

10.3 | Where Is Agriculture Distributed?

People have been able to practice agriculture in a wide variety of places. The most widely used map of world agricultural regions is based on work done by geographer Derwent Whittlesey in 1936.

Agriculture Regions

Learning Outcome 10.3.1 Describe the world's principal agriculture regions.

Whittlesey identified 11 main agriculture regions, plus an area where agriculture was nonexistent (Figure 10-24). Whittlesey's 11 regions are divided between six that are important in developed countries, including the United States, and five that are important in developing countries.

Agriculture Regions in Developed Countries

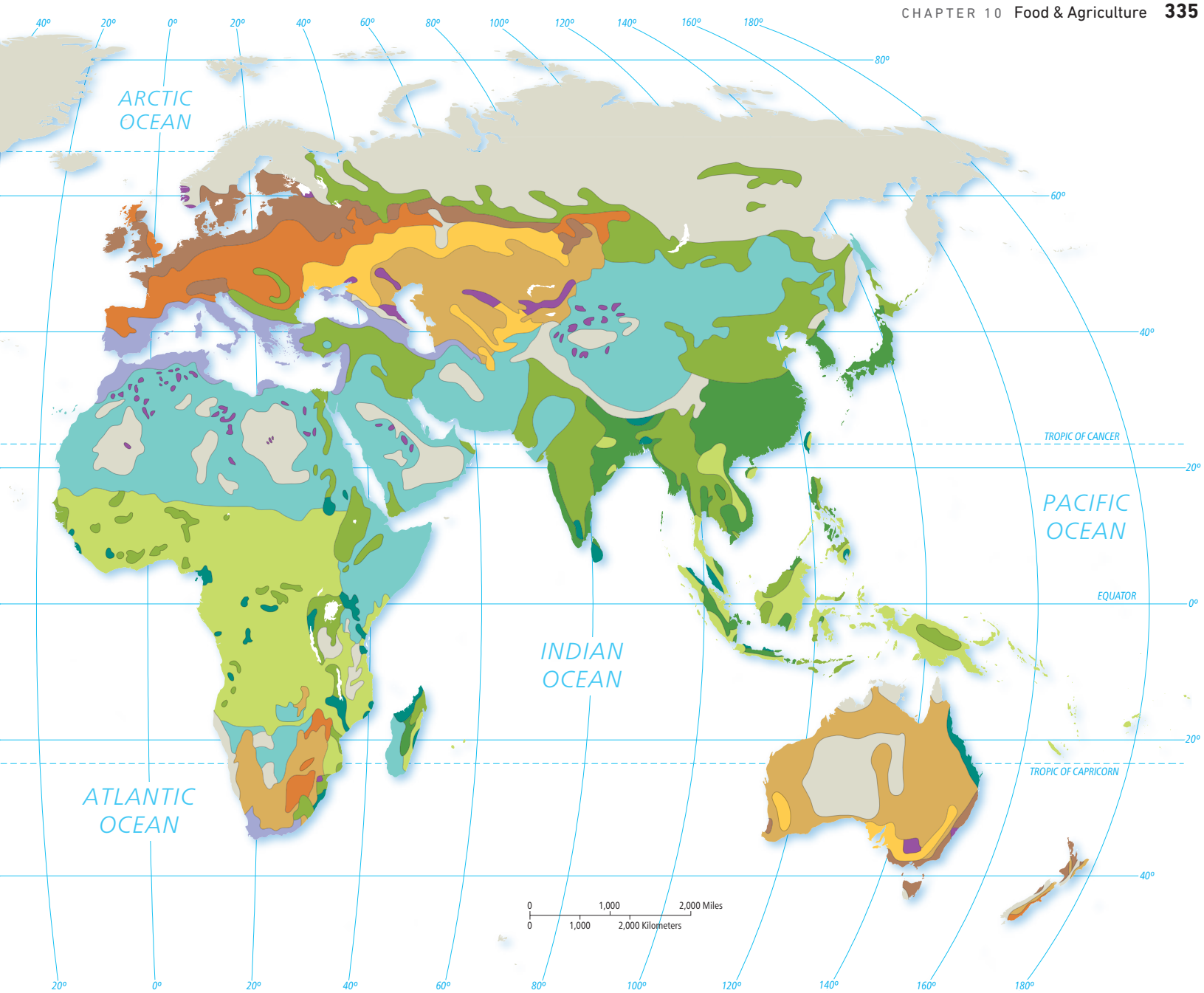
These six agricultural regions predominate in developed countries, including the United States:

- **Mixed crop and livestock:** U.S. Midwest and central Europe.
- **Dairy:** Near population clusters in northeastern United States, southeastern Canada, and northwestern Europe.
- **Grain:** North-central United States, south-central Canada, and Eastern Europe.
- **Livestock ranching:** Drylands of western North America (Figure 10-25), southeastern Latin America, Central Asia, sub-Saharan Africa, and the South Pacific.
- **Mediterranean:** Lands surrounding the Mediterranean Sea, the western United States, the southern tip of Africa, and Chile.
- **Commercial gardening:** East Coast of the United States and southeastern Australia.

Pause & Reflect 10.3.1 What accounts for the absence of any designated agricultural region in northern Canada and Europe?

▲ **FIGURE 10-24 AGRICULTURE REGIONS**

▼ **FIGURE 10-25 AGRICULTURE IN THE UNITED STATES** Cattle ranch, Colorado.



Agriculture Regions in Developing Countries

These five agriculture regions predominate in developing countries:

- **Intensive subsistence, wet rice dominant:** Large population concentrations of East Asia and South Asia.
- **Intensive subsistence, wet rice not dominant:** Large population concentrations of East Asia and South Asia, where growing rice is difficult.
- **Shifting cultivation:** Tropical regions of Latin America, sub-Saharan Africa, and Southeast Asia.
- **Pastoral nomadism:** Drylands of Southwest Asia & North Africa, Central Asia, and East Asia.
- **Plantation:** Tropical and subtropical regions of Latin America, sub-Saharan Africa, South Asia, and Southeast Asia (Figure 10-26).

▼ **FIGURE 10-26 PLANTATION** Workers weed on sugarcane plantation, Sertãozinho, Brazil.

Crop-Based Agriculture in Developed Countries

Learning Outcome 10.3.2 Describe the basic principles of several forms of crop-based agriculture in developed countries.

Agriculture in developed countries can be divided into six main types: grain, Mediterranean, commercial gardening and fruit, mixed crop and livestock, dairy, and ranching. Farmers of the first three – grain, Mediterranean, commercial gardening and fruit – derive most of their income from the sale of crops, and farmers of the second three – mixed crop and livestock, dairy, and ranching – from the sale of animal products.

The principal system of farming found in developed countries is called **agribusiness** because farming is integrated into a large food-production industry. Farmers account for only around 1 percent of the U.S. labor force, but more than 10 percent of U.S. laborers work in food production and services related to agribusiness – food processing, packaging, storage, distribution, and retailing. Agribusiness also encompasses such diverse enterprises as tractor manufacturing, fertilizer production, and seed distribution.

Most aspects of agribusiness are controlled by large corporations. In agribusiness, agricultural products are not sold directly to consumers but to food-processing companies. Large processors, such as General Mills and Kraft Heinz, typically sign contracts with commercial farmers to buy their crops and animals.

Grain Farming

The major crop on most farms is grain, such as wheat, corn, oats, barley, rice, and millet. Crops on a grain farm are grown primarily for consumption by humans rather than by livestock. Large-scale grain production, like other commercial farming ventures in developed countries, is heavily mechanized, conducted on large farms, and oriented to consumer preferences. **Monocropping**, which is the practice of growing the same single crop every year after year, is typically practiced. Commercial grain farms sell their output to manufacturers of food products, such as breakfast cereal and bread. The most important crop grown is wheat, used to make bread flour (Figure 10-27). Wheat generally can be sold for a higher price than other grains, such as rye, oats, and barley, and it has more uses as human food. It can be stored relatively easily without spoiling and can be transported a long distance. Because wheat has a relatively high value per unit weight, it can be shipped profitably from remote farms to markets.

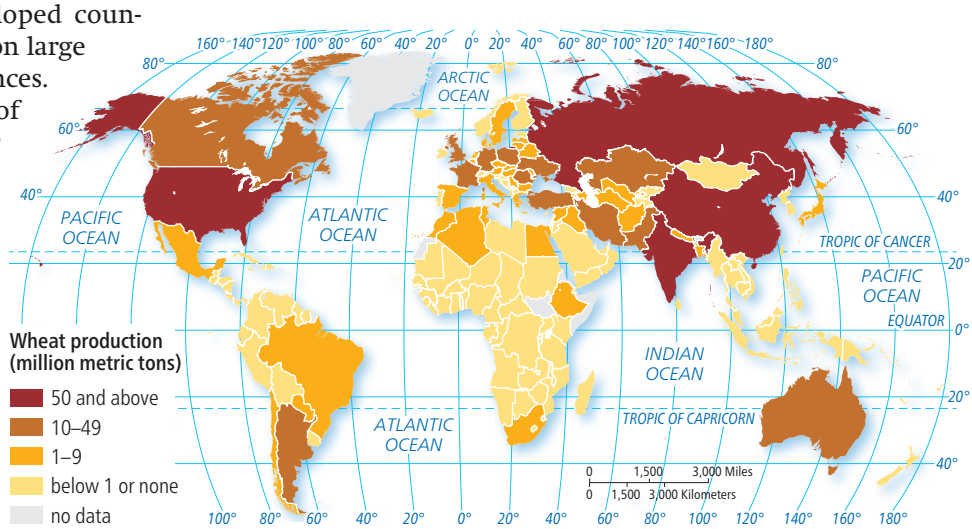
▲ **FIGURE 10-27 WHEAT** A farmer holds grains of ripe wheat.

The share of world production of wheat in developing countries has increased rapidly. Developing countries accounted for more than one-half of world wheat production in 2022, compared to only one-fourth in 1960. China has been the world leader since 1983, and India has been second since 1999 (Figure 10-28).

Commercial grain farms are generally located in regions that are too dry for mixed crop and livestock agriculture. Within North America, large-scale grain production is concentrated in three areas:

- The winter wheat belt through Kansas, Colorado, and Oklahoma, where planting is in the autumn and harvesting in the early summer.
- The spring wheat belt through the Dakotas, Montana, and southern Saskatchewan in Canada, where planting is in the spring and harvesting in the late summer.
- The Palouse region of Washington State, where planting is in the fall and harvesting in the summer.

Wheat's significance extends beyond the amount of land or number of people involved in growing it. Unlike other agricultural products, wheat is grown to a considerable extent for international trade, and it is the world's leading export crop. The United States and Canada account for about one-fourth of the world's wheat exports. The ability to provide food for many people elsewhere in the world is a major source of economic and political strength for these two countries.



▲ **FIGURE 10-28 WHEAT PRODUCTION** China and India are the leading wheat producers, followed by Russia and the United States.
Source: U.N. FAO

Mediterranean Agriculture

Mediterranean agriculture exists primarily on the lands that border the Mediterranean Sea in Southern Europe, North Africa, and western Asia. Farmers in California, central Chile, the southwestern part of South Africa, and southwestern Australia practice Mediterranean agriculture as well.

These Mediterranean areas share a similar physical environment (refer to Figure 10-52). Every Mediterranean area borders a sea (Figure 10-29). Prevailing sea winds provide moisture and moderate the winter temperatures. Summers are hot and dry, but sea breezes provide some relief. The land is very hilly, and mountains frequently plunge directly to the sea, leaving very narrow strips of flat land along the coast.

Most crops in Mediterranean lands are grown for human consumption rather than for animal feed. **Horticulture** – which is the growing of fruits, vegetables, and flowers – and tree crops form the commercial base of Mediterranean farming. In the lands bordering the Mediterranean Sea, the two most important cash crops are olives and grapes (refer to Figure 4-36). A large portion of California farmland is devoted to fruit and vegetable horticulture, which supplies a large portion of the citrus fruits, tree nuts, and deciduous fruits consumed in the United States.

Commercial Gardening

Commercial gardening (or market gardening or fruit farming) is the predominant type of agriculture in the East Coast of the United States (Figure 10-30). The region has a long growing season and humid climate, and it is accessible to the large number of consumers in the northeast United States. Commercial gardening is frequently called **truck farming**, from the Middle English word *truck*, meaning "barter" or "exchange of commodities."

▲ **FIGURE 10-30 COMMERCIAL GARDENING** Peach farm, Georgia, United States.

Truck farms grow many of the fruits and vegetables that consumers in developed countries demand, such as apples, asparagus, cherries, lettuce, mushrooms, and tomatoes. Some of these fruits and vegetables are sold fresh to consumers, but most are sold to large processors for canning or freezing. Truck farms tend to specialize in a few crops, and a handful of truck farms may dominate the national output of some fruits and vegetables.

A form of truck farming called *specialty farming* has spread to New England, among other places. Farmers are profitably growing crops that have limited but increasing demand among affluent consumers, such as asparagus, peppers, mushrooms, strawberries, and nursery plants. Specialty farming represents a profitable alternative for New England farmers at a time when dairy farming is declining because of relatively high operating costs and low milk prices.

Pause & Reflect 10.3.2 Why might wheat be easier to export than produce from truck farming?

◀ **FIGURE 10-29 MEDITERRANEAN AGRICULTURE** Olive farm, Crete, Greece.

Animal-Based Agriculture in Developed Countries

Learning Outcome 10.3.3 Describe dairy and ranching commercial agriculture.

Ranching is adapted to semiarid or arid land and practiced in developed countries where the vegetation is too sparse and soil too poor to support crops. Dairy farming is the most important agriculture practiced near large urban areas in developed countries.

Livestock Ranching

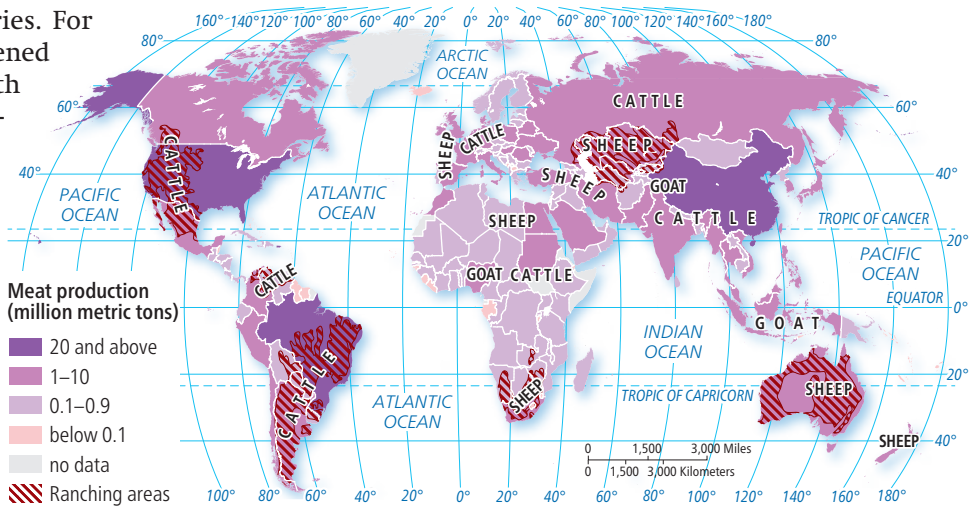
Ranching is the commercial grazing of livestock over an extensive area. Commercial ranching is conducted in several developed countries besides the United States and, increasingly, in developing countries. For example, the interior of Australia was opened for commercial ranching in the nineteenth century, although sheep are more common there than cattle.

China is the leading producer of meat, ahead of the United States, and Brazil is third (Figure 10-31). China passed the United States as the world's leading meat producer in 1990 and now produces twice as much. In South America, a large portion of the pampas of Argentina, southern Brazil, and Uruguay is devoted to ranching cattle and sheep. The cattle industry grew rapidly in Argentina in part because the land devoted to ranching was relatively accessible to the ocean, making it possible for meat to be transported to overseas markets.

The growth in ranching has been in developing countries. Developed countries were responsible for only one-third of world meat production in 2021, compared to two-thirds in 1980 (Figure 10-32).

Meanwhile, due to the spread of irrigation techniques and hardier crops, land in the United States has been converted from ranching to crop growing. Ranching generates lower income per area of land than does crop growing, although ranching has lower operating costs. Cattle are still raised on ranches but are frequently sent for fattening to farms or to local feedlots along major railroad and highway routes rather than directly to meat processors.

Pause & Reflect 10.3.3 What are the two most important ranched animals, according to Figure 10-31?



▲ **FIGURE 10-31 MEAT PRODUCTION** China is now the largest meat producer.
Source: U.N. FAO

▲ **FIGURE 10-32 RANCHING: FEED LOT** Beef cattle fatten in a feed lot in Durango, Mexico.

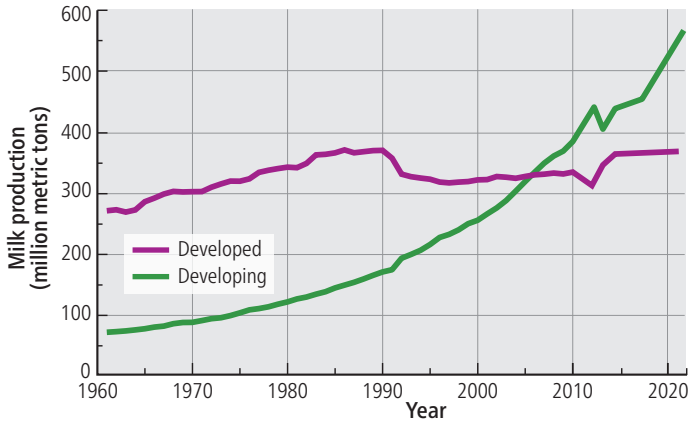
Dairy

A **dairy farm** specializes in the production of milk and other dairy products. Because milk is highly perishable, dairy farms must be closer to their markets than other products. The ring surrounding a city from which milk can be supplied without spoiling is known as the **milkshed**.

Traditionally most milk was produced and consumed in developed countries (Figure 10-33). However, the share of the world's dairy farming conducted in developing countries has risen dramatically in recent years (Figure 10-34). Rising incomes permit urban residents to buy more milk products. Dairy farmers, like other commercial farmers, usually do not sell their products directly to consumers. Instead, they generally sell milk to wholesalers, who distribute it in turn to retailers. Retailers then sell milk to consumers in shops or at home. Farmers also sell milk to butter and cheese manufacturers.

The choice of product varies within the U.S. dairy region, depending on whether the farms are within the milkshed of a large urban area. In general, the farther the farm is from large urban concentrations, the smaller is the percentage of output devoted to fresh milk. Dairy farmers with farms located farther from consumers are more likely to sell their dairy output to processors who make butter, cheese, or dried, evaporated, and condensed milk. The reason is that these products keep fresh longer than milk does and therefore can be safely shipped from remote farms.

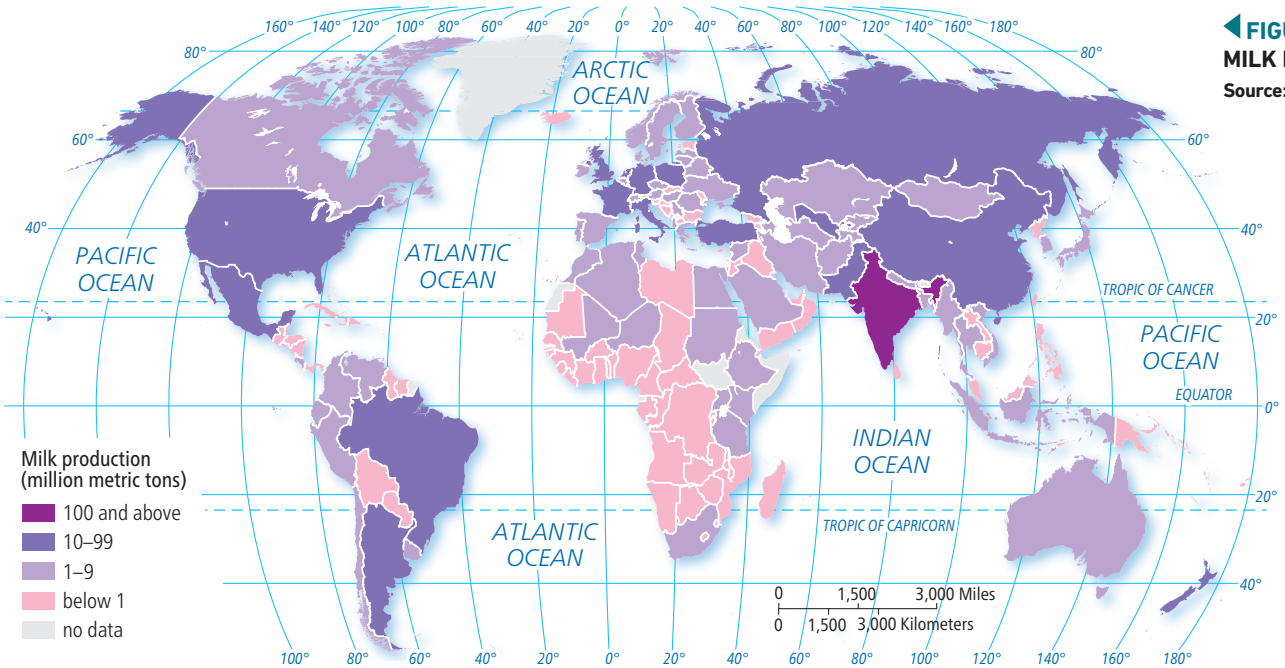
In the East, most of the milk is sold to consumers living in New York, Philadelphia, Boston, and the other large urban areas. Farther west, most milk is processed into cheese and butter. Most of the milk in Wisconsin is processed, for example, compared to only 5 percent in Pennsylvania. The proximity of northeastern farmers to several large markets accounts for these regional differences. Countries likewise tend to specialize in certain products. New Zealand, the world's largest per capita producer of dairy products, devotes about 5 percent to liquid milk, compared to more than 50 percent in the United Kingdom. New Zealand farmers do not sell much liquid milk because the country is too far from North America and Northwest Europe, the two developed regions.



▲ **FIGURE 10-34 CHANGING DAIRY PRODUCTION: DEVELOPED AND DEVELOPING COUNTRIES**

Like other commercial farmers, dairy farmers face economic difficulties because of declining revenues and rising costs. Dairy farmers who have quit most often cite lack of profitability and excessive workload as reasons for getting out of the business. Distinctive features of dairy farming have exacerbated the economic difficulties:

- **Labor-intensive.** Cows must be milked twice a day, every day; although the actual milking can be done by machines, dairy farming nonetheless requires constant attention throughout the year.
- **Winter feed.** Dairy farmers face the expense of feeding the cows in the winter, when they may be unable to graze on grass. In Northwest Europe and in the Northeastern United States, farmers generally purchase hay or grain for winter feed. In the western part of the U.S. dairy region, crops are more likely to be grown in the summer and stored for winter feed on the same farm where the cows are raised.



◀ **FIGURE 10-33 MILK PRODUCTION**
Source: U.N. FAO

Commercial Agriculture: Mixed Crop & Livestock

Learning Outcome 10.3.4 Describe the basic principles of mixed crop and livestock agriculture.

Mixed crop and livestock farming is the most common form of commercial agriculture in much of Europe from France to Russia as well as in the United States west of the Appalachians and east of 98° west longitude, beyond which arid conditions limit farming without irrigation.

Features of Mixed Crop & Livestock

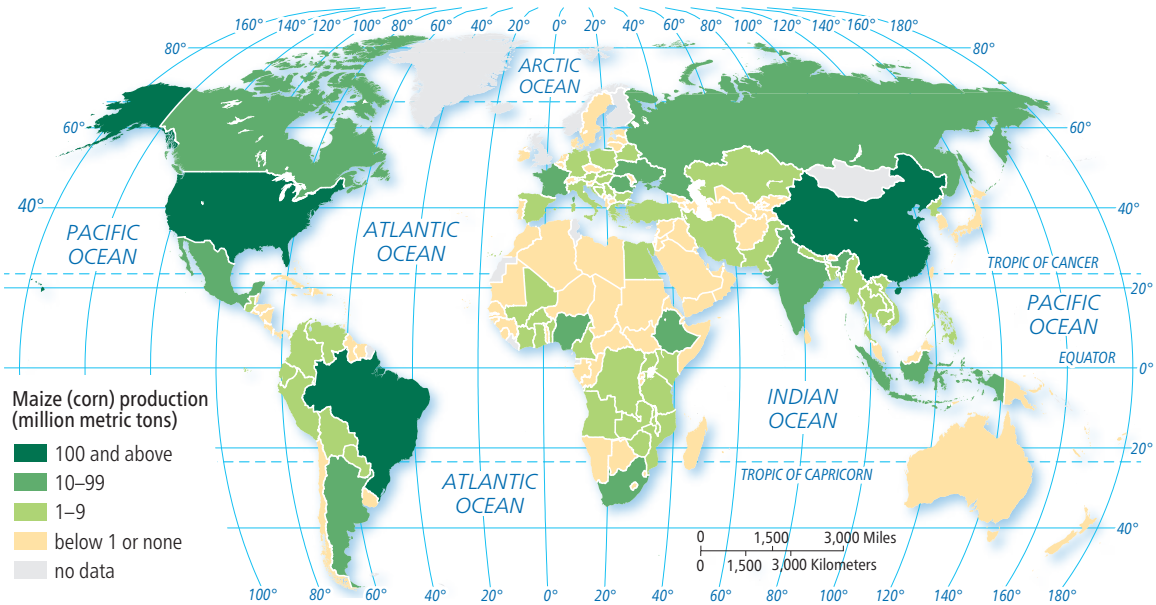
The most distinctive characteristic of **mixed crop and livestock farming** is the integration of crops and livestock. Most of the crops are fed to animals rather than consumed directly by humans. In turn, the livestock supply manure to improve soil fertility to grow more crops. A typical mixed crop and livestock farm devotes nearly all land area to growing crops but derives more than three-fourths of its income from the sale of animal products, such as beef, milk, and eggs. In the United States pigs are often bred directly on the farms, whereas cattle may be brought in to be fattened on corn.

Mixing crops and livestock permits farmers to distribute the workload more evenly through the year. Fields require less attention in the winter than in the spring, when crops are planted, and in the fall, when they are harvested. Meanwhile, livestock require year-round attention. A mix of crops and livestock also reduces seasonal variations in income; most income from crops comes during the harvest season, but livestock products can be sold throughout the year.

In the United States, corn (maize) is the crop most frequently planted in the mixed crop and livestock region because it generates higher yields per area than do other crops (Figure 10-35). Some of the corn is consumed by people as oil, margarine, and other food products, but most is fed to pigs and cattle. The most important mixed crop and livestock farming region in the United States – extending from Ohio to the Dakotas, with its center in Iowa – is frequently called the Corn Belt because around half the cropland is planted in corn (Figure 10-36).

Soybeans have become the second-most-important crop in the U.S. commercial mixed crop and livestock farming region. Like corn, soybeans are mostly used to make animal feed. Tofu (made from soybean milk) is a major food source, especially for people in China and Japan. Soybean oil is widely used in U.S. foods as a hidden ingredient.

▲ **FIGURE 10-36 HARVESTED CORN** Farm near Atlantic, Iowa.



◀ **FIGURE 10-35 MAIZE (CORN) PRODUCTION** The United States produces more than 40 percent and China nearly 20 percent of the world's maize (corn).
Source: U.N. FAO

Importance of Access to Market

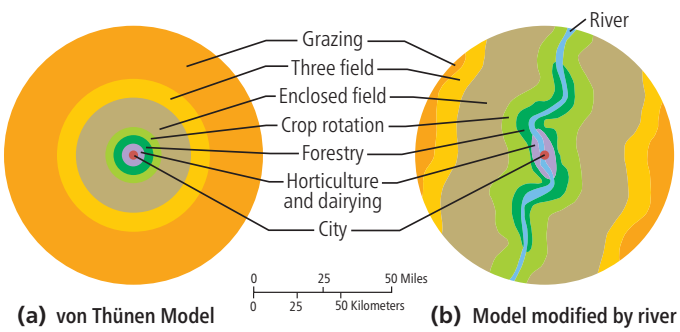
The use of land in developed countries is determined primarily by market forces of supply and demand. The value of the land affects the form of commercial agriculture practiced on it. Agricultural land is lost altogether to some other use if someone buys it for another purpose.

Because the purpose of commercial farming is to sell produce off the farm, the distance from the farm to the market influences the farmer's choice of crop to plant. According to the **bid-rent curve**, the amount that a farmer is willing to pay for land declines with increasing distance from the market. The bid-rent curve also applies to decisions about the use of land in urban areas (see Chapter 13).

Geographers use the von Thünen model to help explain the importance of proximity to market in the choice of crops on commercial farms. Johann Heinrich von Thünen, an estate owner in northern Germany, first proposed the model in 1826, in a book titled *The Isolated State*. According to this model, which geographers later modified, a commercial farmer initially considers which crops to cultivate and which animals to raise based on market location. In choosing an enterprise, the farmer compares two costs: the cost of the land and the cost of transporting products to market.

Von Thünen based his general model of the spatial arrangement of different crops on his experience as the owner of a large estate in northern Germany during the early nineteenth century. He found that specific crops were grown in different rings around the cities in the area (Figure 10-37):

- **First ring.** Market-oriented gardens and milk producers were located in the first ring out from the cities. These products are expensive to deliver and must reach the market quickly because they are perishable.
- **Second ring.** The next ring out from the cities contained wood lots, where timber was cut for construction and fuel; closeness to market is important for this commodity because of its weight.
- **Third ring.** The next ring was used for various crops and for pasture; the specific commodity was rotated from one year to the next.
- **Fourth ring.** The outermost ring was devoted exclusively to animal grazing, which requires lots of space.



▲ **FIGURE 10-37 VON THÜNEN MODEL** (a) According to the von Thünen model, in the absence of topographic factors, different types of farming are conducted at different distances from a city, depending on the cost of transportation and the value of the product. The bid-rent curve suggests that the amount paid for the land is higher closer to the market and decreases with increasing distance from the market. (b) Von Thünen recognized that his model would be modified by site factors, such as a river in this sketch, which changes the accessibility of different land parcels to the market center. Agricultural uses that seek highly accessible locations need to locate nearer the river.

The model assumed that all land in a study area had similar site characteristics and was of uniform quality, although von Thünen recognized that the model could vary according to topography and other distinctive physical conditions. For example, a river might modify the shape of the rings because transportation costs change when products are shipped by water routes rather than over roads. The model also failed to consider that social customs and government policies influence the attractiveness of plants and animals for a commercial farmer.

Table 10-1 illustrates the influence of transportation cost on the profitability of growing wheat. The example in Table 10-1 shows that a farmer would make a profit by growing wheat on land located less than 10,000 kilometers from the market. Beyond 10,000 kilometers, wheat is not profitable because the cost of transporting it exceeds the gross profit. These calculations demonstrate that farms located closer to market tend to select crops with higher transportation costs per hectare of output, whereas more distant farms are more likely to select crops that can be transported less expensively.

Pause & Reflect 10.3.4 According to the von Thünen model, if the price of wheat dropped to $200 per ton, what would be the maximum distance that the wheat could be profitably shipped?

TABLE 10-1 | Transportation in the von Thünen Model

The influence of transportation cost on the profitability of growing wheat, according to the von Thünen model:
• Gross profit from sale of wheat grown on 1 hectare of land not including transportation costs:
a. Wheat can be sold for $250 per metric ton. b. Yield per hectare of wheat is 4 tons. c. Gross profit is $1,000 per hectare ($250 per ton × 4 tons).
• Net profit from sale of wheat grown on 1 hectare of land including transportation costs:
a. Cost of transporting 4 tons of wheat to market is $0.10 per kilometer. b. Net profit from the sale of 4 tons of wheat grown on a farm located 1,000 kilometers from the market is $900 ($1,000 gross profit – $100 for 1,000 kilometers of transport costs). c. Net profit from sale of 1,000 kilograms of wheat grown on a farm located 10,000 kilometers from the market is $0 ($1,000 gross profit – $1,000 for 10,000 kilometers of transport costs).

Subsistence Agriculture in Population Concentrations

Learning Outcome 10.3.5 Explain the principal forms of agriculture in higher-density developing regions.

Three-fourths of the world's people live in developing countries, and the form of subsistence agriculture that feeds most of them is **intensive subsistence agriculture**. The term *intensive* implies that farmers must work intensively to subsist on a parcel of land.

Intensive Subsistence Farming

In developing countries, most people produce food for their own consumption. This is especially true in intensive subsistence agriculture, the most widely practiced form of agriculture in densely populated East, South, and Southeast Asia.

Intensive subsistence agriculture involves careful agricultural practices refined over thousands of years in response to local environmental and cultural patterns. Because the agricultural density – the ratio of farmers to arable land – is so high in parts of East and South Asia, families must produce enough food for their survival from a very small area of land. Most of the work is done by hand or with animals rather than with machines, in part due to abundant labor but largely from lack of funds to buy equipment. Rice is the most important crop in intensive subsistence farming (Figure 10-38).

The typical farm in Asia's intensive subsistence agriculture regions is much smaller than farms elsewhere in the world. Many Asian farmers own several fragmented plots, frequently a result of dividing individual holdings among several children over several centuries. To maximize food production, intensive subsistence farmers waste virtually no land. Corners of fields and irregularly shaped pieces of land are planted rather than left idle. Paths and roads are kept as narrow as possible to minimize the loss of arable land. Livestock are rarely permitted to graze on land that could be used to plant crops, and little grain is grown to feed the animals.

Land is used even more intensively in parts of Asia by obtaining two harvests per year from one field, a process known as **double cropping**. Double cropping is common in places that have warm winters, such as southern China and Taiwan, but is relatively rare in India, where most areas have dry winters. Normally, double cropping involves alternating between wet rice, grown in the summer when precipitation is higher, and wheat, barley, or another dry crop, grown in the drier winter season. Crops other than rice may be grown in the wet rice region in the summer on nonirrigated land.

Wet Rice Not Dominant

Climate discourages farmers from growing wet rice in portions of Asia, especially where summer precipitation levels are too low and winters are too harsh. Agriculture in much of the interior of India and northeastern China is devoted to crops other than wet rice. Wheat is the most important crop, followed by barley. Other grains and legumes are grown for household consumption, including millet, oats, corn, sorghum, and soybeans. In addition, some crops are grown in order to be sold for cash, such as cotton, flax, hemp, and tobacco.

Aside from what is grown, this region shares most of the features of the wet rice region. Land is used intensively and worked primarily by human power, with the assistance of some hand implements and animals. In milder parts of the region where wet rice does not dominate, more than one harvest can be obtained some years through skilled use of **crop rotation**, which is the practice of rotating use of different fields from crop to crop each year to avoid exhausting the soil. In colder climates, wheat or another crop is planted in the spring and harvested in the fall, but no crops can be sown through the winter.

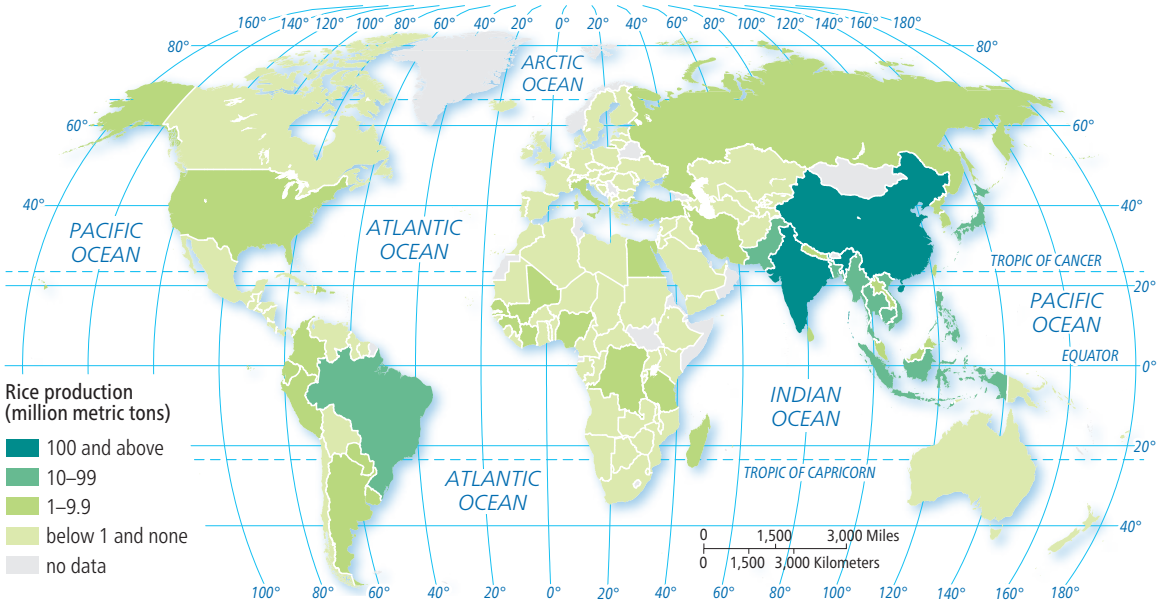


FIGURE 10-38 RICE PRODUCTION China and India produce one-half of the world's rice.

Wet Rice Dominant

The intensive agriculture region of Asia can be divided between areas where wet rice dominates and areas where it does not. The term **wet rice** refers to rice planted on dry land in a nursery and then moved as seedlings to a flooded field to promote growth. Wet rice occupies a relatively small percentage of Asia's agricultural land but is the region's most important source of food.

Intensive wet rice farming is the dominant type of agriculture in southeastern China, East India, and much of Southeast Asia. China and India account for nearly 50 percent of the world's rice production, and more than 90 percent is produced in East, South, and Southeast Asia.

Successful production of large yields of rice is an elaborate process that is time-consuming and done mostly by hand. The consumers of the rice also perform the work, and all family members, including children, contribute to the effort. Growing rice involves four principal steps. All of the steps are intensive:

1. The field is prepared, typically using animal power (Figure 10-39). Flat land is needed to grow rice, so hillsides are terraced and the field is flooded with water. The flooded field is called a **sawah** in Indonesia and is increasingly referred to as a **paddy**, which is actually the Malay word for "wet rice."
2. Rice seedlings grown for the first month in a nursery are transplanted into the flooded field (Figure 10-40).
3. Rice plants are harvested with knives (Figure 10-41).
4. The chaff (husks) is separated from the seeds by threshing (beating) the husks on the ground. The threshed rice is placed in a tray for winnowing, in which the lighter chaff is allowed to be blown away by the wind (Figure 10-42).

Pause & Reflect 10.3.5 What challenges might farmers in Asia face if they wish to adopt farming practices that are less labor-intensive than growing wet rice?

▼ **FIGURE 10-39 GROWING RICE: PREPARING THE FIELD** Oxen help prepare the sawah, Bali, Indonesia.

▼ **FIGURE 10-40 GROWING RICE: TRANSPLANTING PLANTS** Rice plants are transplanted by hand, Bali, Indonesia.

▼ **FIGURE 10-41 GROWING RICE: HARVESTING** Rice plants are harvested with knives, Bali, Indonesia.

▼ **FIGURE 10-42 GROWING RICE: HARVESTING** Winnowing the rice, Bali, Indonesia.

Shifting Cultivation

Learning Outcome 10.3.6 Explain the principal forms of subsistence agriculture in lower-density tropical regions.

A form of subsistence agriculture in which people shift frequently from one field to another is known as **shifting cultivation**. It is practiced in much of the world's tropical, or A, climate regions, which have relatively high temperatures and abundant rainfall (refer ahead to Figure 10-51). It is practiced by roughly 250 million people across 36 million square kilometers (14 million square miles), especially in the tropical rain forests of Latin America, sub-Saharan Africa, and Southeast Asia. The gap between the small number of people and large amount of land area is logical because the practice of frequently shifting from one field to another requires more land per person than do other types of agriculture.

Features of Shifting Cultivation

Two distinctive features of shifting cultivation are:

- **Slash & burn.** Farmers clear land for planting by slashing vegetation and burning the debris; shifting cultivation is sometimes called *slash-and-burn agriculture.*
- **Frequent relocation.** Farmers grow crops on a cleared field for only a few years, until soil nutrients are depleted, and then leave it fallow (with nothing planted) for many years so the soil can recover.

People who practice shifting cultivation generally live in small villages and grow food on the surrounding land, which the village controls. Each year villagers designate for planting an area surrounding the settlement. Before planting, they must remove the dense vegetation that typically covers tropical land (Figure 10-43). Using axes, they cut down most of the trees, sparing only those that are economically useful. The undergrowth is cleared away with a machete or other long knife. On a windless day the debris is burned under carefully controlled conditions (Figure 10-44). The rains wash the fresh ashes into the soil, providing needed nutrients.

▼ **FIGURE 10-43 SHIFTING CULTIVATION: SLASHING** Vegetation is cut down in order to have a cleared field for planting, Laos.

▲ **FIGURE 10-44 SHIFTING CULTIVATION: BURNING** Debris that has been cut down is burned, Laos.

Before planting, the cleared area, known by a variety of names in different regions, including *swidden, lading, milpa, chena,* and *kaingin,* is prepared by hand, perhaps with the help of a simple implement such as a hoe; plows and animals are rarely used (Figure 10-45). The only fertilizer generally available is potash (potassium) from burning the debris when the site is cleared. Little weeding is done the first year that a cleared patch of land is farmed; weeds may be cleared with a hoe in subsequent years.

The cleared land can support crops only briefly, usually three years or less. In many regions, the most productive harvest comes in the second year after burning. Thereafter, soil nutrients are rapidly depleted and the land becomes too infertile to nourish crops. Rapid weed growth also contributes to the abandonment of a swidden after a few years.

When the swidden is no longer fertile, villagers identify a new site and begin clearing it. They leave the old site uncropped for many years, allowing it to become overrun again by natural vegetation. The field is not actually abandoned; the villagers will return to the site someday, perhaps as few as six years or as many as 20 years later, to begin the process of clearing the land again. In the meantime, they may still care for fruit-bearing trees on the site.

If a cleared area outside a village is too small to provide food for the population, then some of the people may establish a new village and practice shifting cultivation there. Some farmers may move temporarily to another settlement if the field they are clearing that year is distant.

▼ **FIGURE 10-45 SHIFTING CULTIVATION: PREPARING THE FIELD** A field cleared by slashing and burning is prepared for planting, Guiglo, Côte d'Ivoire.

Crops of Shifting Cultivation

The crops grown by each village vary by local custom and taste. The predominant crops include upland rice in Southeast Asia, maize (corn) and manioc (cassava) in South America, and millet and sorghum in Africa. Yams, sugarcane, plantains, and vegetables are also grown in some regions. These crops have originated in one region of shifting cultivation and have diffused to other areas in recent years.

The Kayapo people of Brazil's Amazon tropical rain forest do not arrange crops in the rectangular fields and rows that are familiar to us. They plant in concentric rings. At first, they plant sweet potatoes and yams in the inner area (Figure 10-46). In successive rings go corn and rice, manioc, and more yams. In subsequent years the inner area of potatoes and yams expands to replace corn and rice. The outermost ring contains plants that require more nutrients, including papaya, banana, pineapple, mango, cotton, and beans. It is here that the leafy crowns of cut trees fall when the field is cleared, and their rotting releases more nutrients into the soil.

Most families grow only for their own needs, so one swidden may contain a large variety of intermingled crops, which are harvested individually at the best time. In shifting cultivation, a "farm field" appears much more chaotic than do fields in developed countries, where a single crop such as corn or wheat may grow over an extensive area. In some cases of shifting cultivation, families may specialize in a few crops and trade some of what they grow for other goods.

Future of Shifting Cultivation

Land devoted to tropical rainforests is declining worldwide at the rate of about 20,000 square kilometers (4.8 million acres), or 0.2 percent, per year according to the United Nations. One-sixth of the Amazon tropical rainforest has been cut down since 1970. Until recent years, the World Bank supported deforestation with loans to finance development schemes that required clearing forests (Figure 10-47).

Shifting cultivation is being replaced by other forms of agriculture, including logging, cattle ranching, and the cultivation of cash crops. Selling timber to builders or raising beef cattle for fast-food restaurants are more effective development strategies than maintaining shifting cultivation. Developing countries also see shifting cultivation as an inefficient way to grow food in a hungry world. Indeed, compared to other forms of agriculture, shifting cultivation can support only a small population in an area without causing environmental damage.

To its critics, shifting cultivation is at best a preliminary step in economic development. Pioneers use shifting cultivation to clear forests in the tropics and to open land for development where permanent agriculture never existed. People unable to find agricultural land elsewhere can migrate to the tropical forests and initially practice shifting cultivation. Critics say it then should be replaced by more sophisticated agricultural techniques that yield more per land area.

Defenders of shifting cultivation consider it the most environmentally sound approach for the tropics. Practices used in other forms of agriculture, such as fertilizers and pesticides and permanently clearing fields, may damage the soil, cause severe erosion, and upset balanced ecosystems.

FIGURE 10-46 SHIFTING CULTIVATION: HARVESTING A Kayapo woman in Brazil's Amazon region uses a machete to harvest.

Large-scale destruction of the rain forests also may contribute to climate change. When large numbers of trees are cut, their burning and decay release large volumes of carbon dioxide. This gas can build up in the atmosphere, acting like the window glass in a greenhouse to trap solar energy in the atmosphere, resulting in the "greenhouse effect," discussed in Chapter 14. Elimination of shifting cultivation could also upset the traditional local diversity of cultures in the tropics. The activities of shifting cultivation are intertwined with other social, religious, political, and various folk customs. A drastic change in the agricultural economy could disrupt other activities of daily life.

As the importance of tropical rain forests to the global environment has become recognized, developing countries have been pressured to restrict further destruction of them. Many nonprofit organizations are helping indigenous groups to undertake innovative agricultural projects other than cutting down timber, such as growing organic products and to promote eco-tourism.

Pause & Reflect 10.3.6 How would rapid population growth make it difficult to practice shifting cultivation?

FIGURE 10-47 AMAZON DEFORESTATION Illegal logging in the rainforest, Pará, Brazil.

Pastoral Nomadism & Plantations

Learning Outcome 10.3.7 Explain the principal forms of subsistence agriculture in lower-density, dry regions.

Pastoral Nomadism

A form of subsistence agriculture called **pastoral nomadism** is based on the herding of domesticated animals in dry climates, where planting crops is challenging. Pastoral nomads, unlike other subsistence farmers, depend primarily on animals rather than crops for survival. The Bedouins of Saudi Arabia and North Africa and the Masai of East Africa are examples of pastoral nomads (Figure 10-48).

The animals herded by pastoral nomads provide milk, and their skins and hair are used for clothing and tents. Their animals are usually not slaughtered, although dead ones may be consumed. To pastoral nomads, the size of their herd is both an important measure of power and prestige and their main security during adverse environmental conditions. Like other subsistence farmers, though, pastoral nomads consume mostly grain rather than meat. To obtain grain, many present-day pastoral nomads do raise crops or obtain them by trading animal products.

Pastoral nomads select the type and number of animals for the herd according to local cultural and physical characteristics. The choice depends on the relative prestige of animals and the ability of species to adapt to a particular climate and vegetation:

- Cattle have traditionally been most common in the dry lands of East Africa, where they can feed on scrub and grasses in land unsuitable for planting crops. They are valued for their relatively high milk yield.
- Camels are well suited to arid climates because they can go long periods without water, carry heavy baggage, and move rapidly.
- Goats need more water than do camels but are tough and agile and can survive on virtually any vegetation, no matter how poor.
- Sheep are relatively slow moving and affected by climatic changes. They require more water than camels and goats and are more selective about which plants they will eat.

FIGURE 10-48 NOMADS TEND THE FLOCK East Africa.

Agricultural experts once regarded pastoral nomadism as a stage in the evolution of agriculture – between the hunters and gatherers who migrated across Earth's surface in search of food and sedentary farmers who cultivated grain in one place. Because they had domesticated animals but not plants, pastoral nomads were considered more advanced than hunters and gatherers but less advanced than settled farmers.

Pastoral nomadism is now generally recognized as an offshoot of sedentary agriculture, not as a primitive precursor of it. It is simply a practical way of surviving on land that receives too little rain for cultivation of crops.

Today, pastoral nomadism is a declining form of agriculture, partly a victim of modern technology. Before recent transportation and communications inventions, pastoral nomads played an important role as carriers of goods and information across the sparsely inhabited drylands. They used to be the most powerful inhabitants of the drylands, but now, with modern weapons, national governments can control nomadic peoples more effectively and limit their movement within their traditional territories.

Governments force groups to give up pastoral nomadism because they want the land for other uses. Land that can be irrigated is converted from pastoral nomadic to sedentary agriculture. In some instances, the mining and petroleum industries now operate in drylands formerly occupied by pastoral nomads. Some pastoral nomads are encouraged to try sedentary agriculture or to work for mining or petroleum companies. Others are still allowed to move about, but only within ranches of fixed boundaries. In the future, pastoral nomadism will be increasingly confined to areas that cannot be irrigated or that lack valuable raw materials.

Some pastoral nomads practice **transhumance**, which is seasonal migration of livestock between mountains and lowland pasture areas (Figure 10-49). Pasture is grass or other plants grown for feeding grazing animals as well as land used for grazing. Sheep or other animals may pasture in alpine meadows in the summer and be herded back down into valleys for winter pasture.

Pause & Reflect 10.3.7 How might the limitations on movement affect pastoral nomads' ability to find food and forage for their animals?

FIGURE 10-49 TRANSHUMANCE Pyrenees Mountains, Spain.

Plantation Farming

A **plantation** is a large commercial farm in a developing country that specializes in one or two crops. Most plantations are located in the tropics and subtropics, especially in Latin America, Africa, and Asia. Although generally situated in developing countries, plantations are often owned or operated by Europeans or North Americans, and they grow crops for sale primarily to developed countries. Among the most important cash crops grown on plantations are cotton, coffee, rubber, tobacco, and sugarcane (Figure 10-50). Also produced in large quantities are cocoa, jute, bananas, tea, coconuts, and palm oil.

Until the Civil War, plantations were important in the U.S. South, where the principal crop was cotton, followed by tobacco and sugarcane. People brought from Africa were enslaved to performed most of the labor until the abolition of slavery and the defeat of the South in the Civil War. Thereafter, plantations declined in the United States; they were subdivided and either sold to individual farmers or worked by tenant farmers.

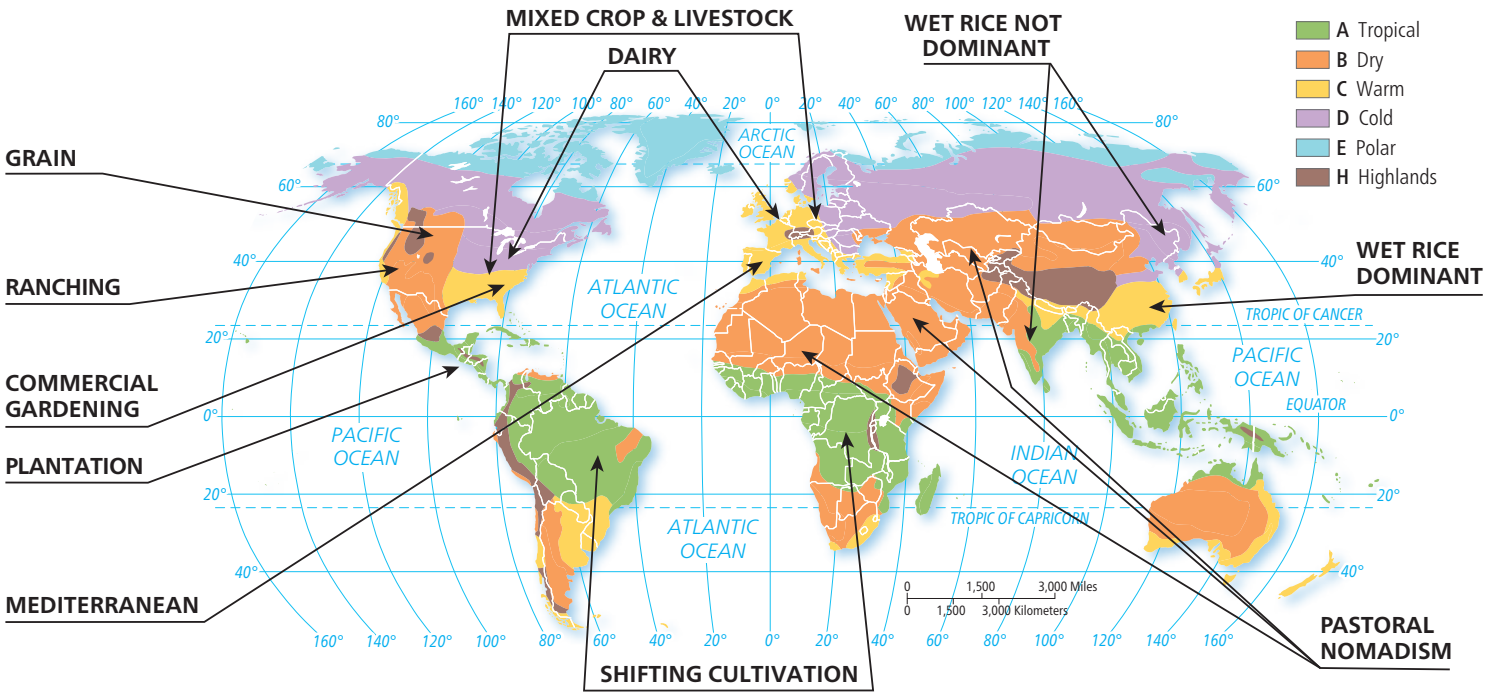
▲ **FIGURE 10-50 PLANTATION** Sugarcane plantation, Botolambat, Indonesia.

Agricultural Regions & Climate

Similarities between the agriculture and climate maps are striking (Figure 10-51). For example, pastoral nomadism is the predominant type of agriculture in Southwest Asia & North Africa, which has a dry climate, whereas shifting cultivation is the predominant type of agriculture in sub-Saharan Africa, which has a tropical climate. Note the division between southeastern China (warm mid-latitude climate, intensive subsistence agriculture with wet rice dominant) and northeastern China (cold mid-latitude climate, intensive subsistence agriculture with wet rice not dominant).

In the United States, much of the West is distinguished from the rest of the country according to climate (dry) and agriculture (livestock ranching). Thus, agriculture varies between the drylands and the tropics within developing countries – as well as between the drylands of developing countries and developed countries.

▼ **FIGURE 10-51 CLIMATE AND AGRICULTURE REGIONS**



Fishing

Learning Outcome 10.3.8 Describe the contribution of fishing to the world food supply.

Food acquired from Earth's waters includes fish, crustaceans (such as shrimp and crabs), mollusks (such as clams and oysters), and aquatic plants (such as watercress). Water-based food is acquired in two ways:

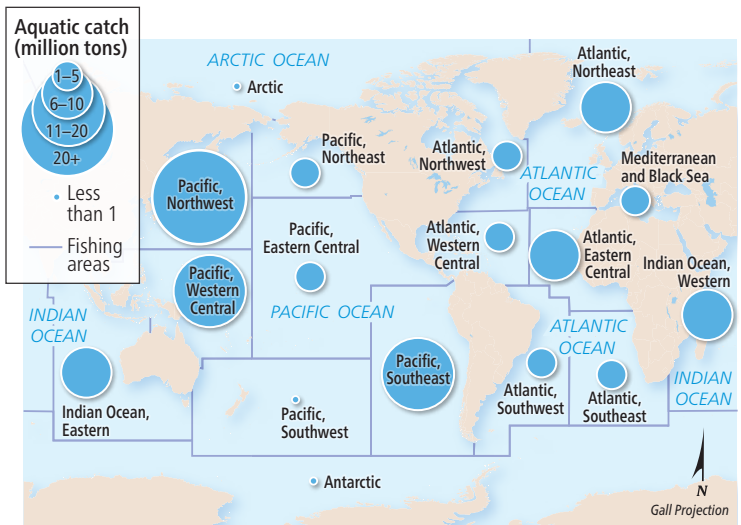
- **Fishing** is the capture of wild fish and other seafood living in the waters.
- **Aquaculture**, or aquafarming, is the cultivation of seafood under controlled conditions (Figure 10-52).

Historically the sea has provided only a small percentage of the world food supply. So at first glance, increased use of food from the sea is attractive. Oceans are vast, covering nearly three-fourths of Earth's surface and lying near most population concentrations. However, overfishing has reduced fish supplies in many regions.

The world's oceans are divided into 17 major fishing regions, including six each in the Atlantic and Pacific oceans, two in the Indian Ocean, and one each in the Arctic and Antarctic oceans and Mediterranean Sea (Figure 10-53). Fishing is also conducted in inland waterways, such as lakes and rivers. The areas with the largest yields are the Pacific Northwest and Asia's inland waterways.

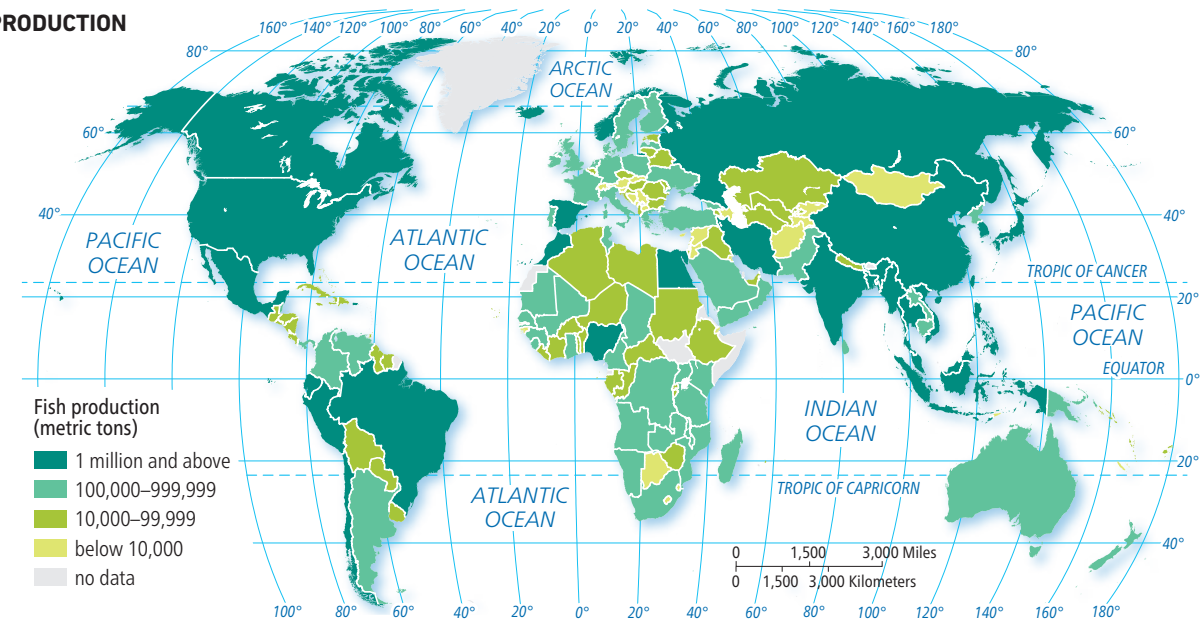
Most of the world's fishing takes place in Asia. China is responsible for around 41 percent of the world's yield of fish, and ten other countries in Asia together are responsible for 32 percent of the world's yield of fish (Figure 10-54). Around 20 percent of the world's capture of wild fish takes place in China's water, and ten other Asian countries together account for another 31 percent of the world's total. Asia is especially dominant in aquaculture. Around 58 percent of the world's aquaculture takes place in China and another 32 percent in ten other Asian countries.

▲ **FIGURE 10-52 AQUACULTURE** Harvesting carp from a fish farm, Germany.



▲ **FIGURE 10-53 MAJOR FISHING REGIONS**
Source: U.N. FAO

▶ **FIGURE 10-54 FISH PRODUCTION**
Source: U.N. FAO

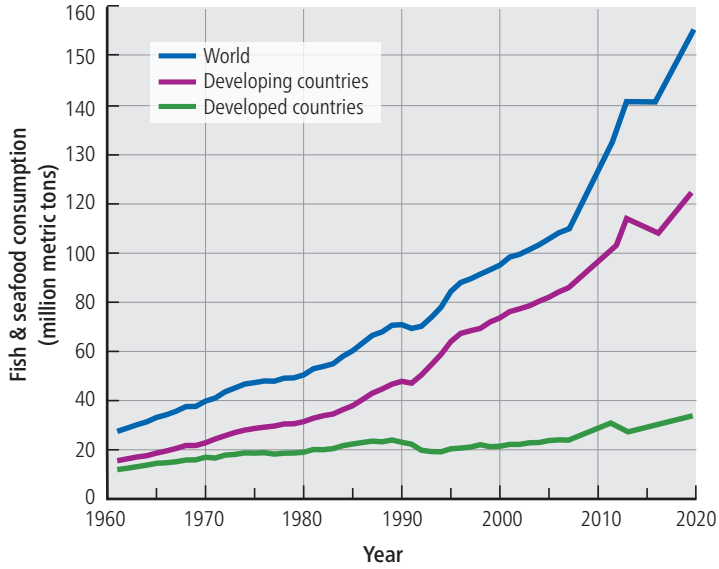


Fish Consumption & Production

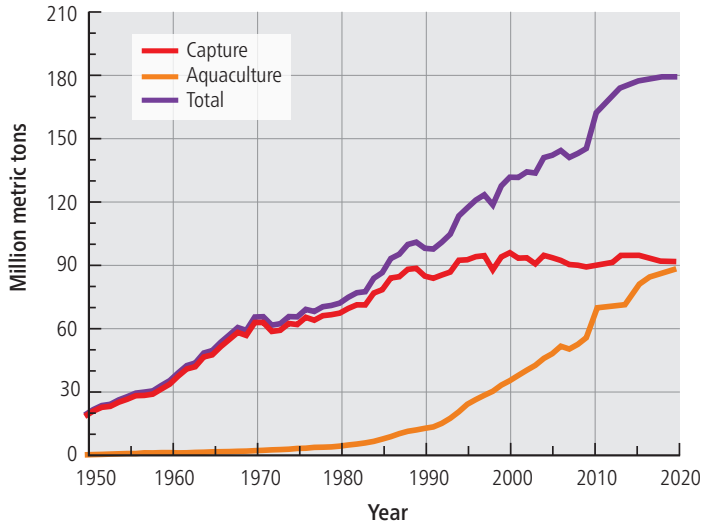
Human consumption of fish and seafood increased from 27 million metric tons in 1960 to 157 million metric tons in 2020. Developing countries are responsible for nearly all of the increase (Figure 10-55). Fish consumption has increased more rapidly than population growth. During the past half-century, per capita consumption of fish has nearly doubled in both developed and developing countries. Still, fish and seafood account for only 1 percent of all calories consumed by humans.

Since 1950, global fish production has increased from approximately 20 to 178 million metric tons (Figure 10-56). Since 1990, the growth has resulted entirely from expansion of aquaculture. The capture of wild fish in the oceans and lakes has stagnated since the 1990s, despite human population growth and increasing demand to consume fish. A comparison of Figures 10-54 and 10-55 shows that production of fish is higher than human consumption of it. Around 90 percent of the fish is consumed directly by humans. The remainder is converted to fish meal and fed to poultry and hogs.

Pause & Reflect 10.3.8 Worldwide, the average person consumes around 14 ounces (400 grams) of fish per week. Why might your consumption be higher or lower than the average?



▲ **FIGURE 10-55 GROWTH IN HUMAN CONSUMPTION OF FISH**



▲ **FIGURE 10-56 GROWTH IN FISH PRODUCTION**
Source: U.N. FAO

Overfishing

The population of some fish species in the oceans and lakes has declined because of **overfishing**, which is capturing fish faster than they can reproduce (Figure 10-57). Overfishing has been particularly acute in the North Atlantic and Pacific oceans. Overfishing has reduced the population of tuna and swordfish by 90 percent in the past half-century, for example. The U.N. estimates that one-quarter of fish stocks have been overfished and one-half fully exploited, leaving only one-fourth underfished.

▶ **FIGURE 10-57 OVERFISHING** Türkiye fishing boats cluster in the Black Sea, which suffers from overfishing.

KEY ISSUE

10.4 | Why Do Farmers Face Sustainability Challenges?

Both subsistence and commercial agriculture face a complex challenge: to produce more food for a growing world while preserving Earth's agricultural resources for the future. The future of food and agriculture is being pulled in global and local directions. On the one hand, an increasingly integrated global agricultural system is devoted to producing the most food at the lowest cost for the world's 8 billion humans. But critics charge that the global agriculture system is causing major long-term damage to the environment and to local ecosystems for the sake of short-term production.

Global Food Trade

Learning Outcome 10.4.1 Explain the contribution of expanding exports to world food supply.

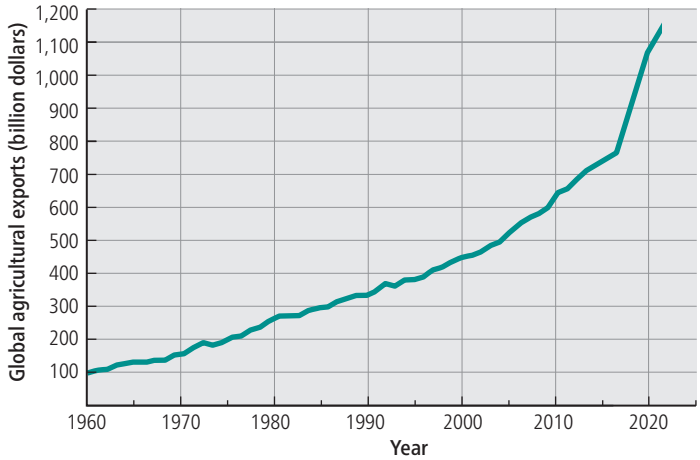
In response to an increasing global need for food during the twentieth century, the United States enacted the Agricultural Trade Development and Assistance Act of 1954 (known as P.L. 480). Title I of the act provided for the sale of grain at low interest rates, and Title II gave grants to needy groups of people. P.L. 480 was replaced by the Food, Agriculture, Conservation, and Trade Act of 1990.

Trade in food has continued to increase rapidly in the twenty-first century. Total agricultural exports from all countries have increased from $448 billion in 2000 to $1.7 trillion in 2021 (Figure 10-58). Exporting countries benefit from the revenues, and importing countries meet the food needs of their people. However, increased food trade is generating challenges for both exporting and importing countries.

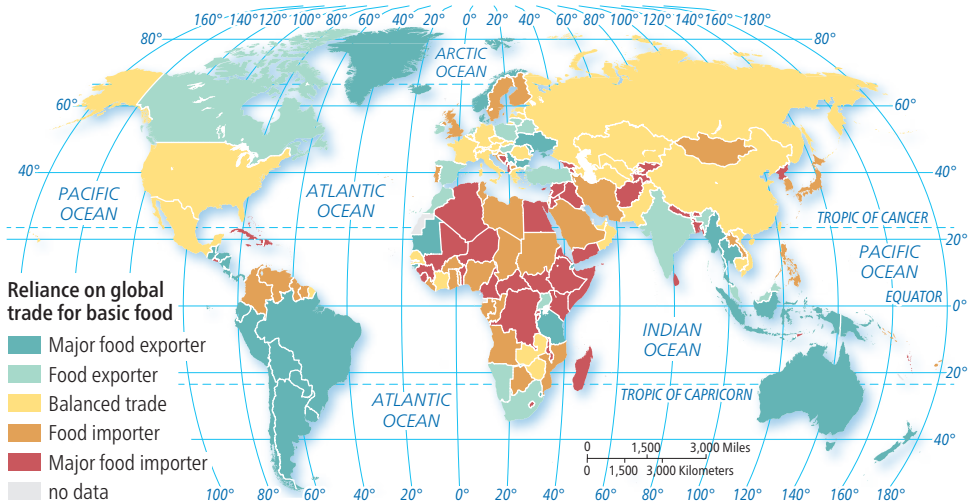
Europe was the only major food importing region prior to World War II. Historically, European countries used their colonies as suppliers of food; after they became independent countries, the former colonies sold food to Europe. Europe as a whole is now a net exporter of food. The Netherlands and Spain account for much of Europe's balance, as was Ukraine prior to the disruption in its exports it was invaded by Russia in 2022.

East Asia became a net food importer in the 1950s and is now the world's leading importing region. China is by far the world's largest net importer of food, followed by Japan. Southwest Asia & North Africa became a net importing region during the 1970s and is now second to East Asia for the highest level of net imports of food. South Asia and sub-Saharan Africa became net importers of food during the 1980s and Central Asia did in 2008, and the three regions continue to be net importers of food today. Food production was unable to keep up with rapid population growth in all of these regions, and as they embraced international trade, agriculture was increasingly devoted to growing export crops for sale in developed countries.

On a global scale, agricultural products are moving primarily from the Western Hemisphere to the Eastern Hemisphere. Latin America, led by Brazil and Argentina, is by far the leading region for export of agricultural products; North America, Southeast Asia, and the South Pacific are the other major exporting regions. The United States is the world's leading exporting country for agricultural products, but it is also the second leading importing country behind China. As a result, the United States exports only slightly more food than it imports (Figure 10-59). Similarly, European countries such as France and Italy are both leading exporters and leading importers of agricultural products.



▲ **FIGURE 10-58 AGRICULTURAL EXPORTS** Agricultural trade has increased steadily over the past half-century.



▲ **FIGURE 10-59 TRADE BALANCE IN AGRICULTURE** Most African countries import more food than they export, whereas most South American countries export more food than they import.

Trade Challenges for Developing Countries

To expand production, subsistence farmers need higher-yield seeds, fertilizer, pesticides, and machinery. For many African and Asian countries, the main way to obtain agricultural supplies is to import them from other countries. To generate the funds that they need to buy agricultural supplies, developing countries must produce something they can sell in developed countries. Some developing countries sell manufactured goods (see Chapter 11), but most developing countries raise funds through the sale of crops in developed countries. Consumers in developed countries are willing to buy fruits and vegetables that would otherwise be out of season or for crops such as coffee and tea that cannot be grown in developed countries because of the climate.

In a developing country such as Kenya, families may organize the work between traditional subsistence agriculture and cash crops based on gender. Women practice most of the subsistence agriculture – that is, growing food for their families to consume – in addition to the tasks of cooking, cleaning, and carrying water from wells. Men may work for wages, either growing crops for export or at jobs in distant cities. Women may generate income for the household by making clothes, jewelry, baked goods, and other objects for sale in local markets.

The sale of export crops brings a developing country foreign currency, a portion of which can be used to buy agricultural supplies. But governments in developing countries face a dilemma: The more land that is devoted to growing export crops, the less that is available to grow crops for domestic consumption. Rather than help to increase productivity, the funds generated through the sale of export crops may be needed to feed the people who switched from subsistence farming to growing export crops.

Wheat is the most important cereal grain in Egypt (refer to Figure 10-4), but the country must import around half of the wheat needed to bake pita bread (Figure 10-60). Egypt's imported wheat has come primarily from Ukraine and Russia, but Russia's invasion of Ukraine disrupted wheat exports from the two countries, creating a hardship in Egypt (Figure 10-61).

Drug Trade

Particular export crops grown in some developing countries, especially in Latin America and Asia, are those that can be converted to drugs. Cocaine is derived from coca leaf, nearly all of which is grown in Colombia or the neighboring countries Peru and Bolivia. The principal shipping route is from Colombia to Mexico or other Central American countries and then to the United States (Figure 10-62).

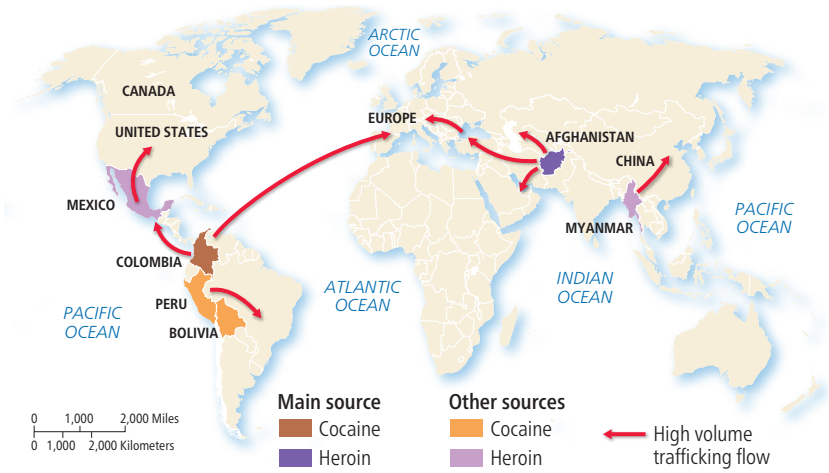
More than 95 percent of the world's opium poppies are grown in Afghanistan, Myanmar, and Mexico. Most traffic flows from Afghanistan through Iran, Türkiye, and the Balkans to Western Europe, where the largest numbers of the world's users live.

▲ **FIGURE 10-60 WHEAT IMPORTS: EGYPT** Bread seller, Cairo.

Marijuana, produced from the *Cannabis sativa* plant, is cultivated widely. Most marijuana that reaches the United States is grown in Mexico.

Pause & Reflect 10.4.1 Why does most consumption of cocaine and heroin occur in developed countries?

▲ **FIGURE 10-61 WHEAT EXPORTS: UKRAINE** Grain awaiting loading on ships, Odesa.



▲ **FIGURE 10-62 INTERNATIONAL DRUG TRAFFICKING** The main routes for heroin are from Afghanistan through Southwest Asia to Europe and through Central Asia to Russia. The main routes for cocaine are from Colombia to North America through Mexico and to Europe by sea.

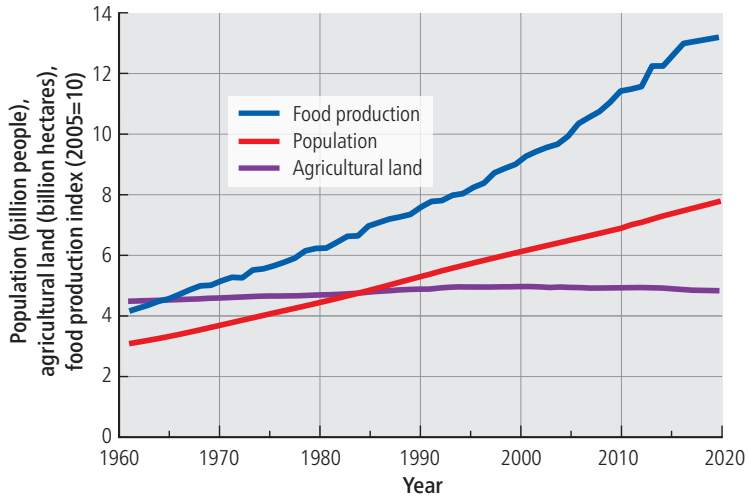
Source: U.N.

Losing Agricultural Land

Learning Outcome 10.4.2 Explain reasons for the lack of growth of farmland.

Historically, world food production increased primarily by expanding the amount of land devoted to agriculture. When the world's population began to increase more rapidly in the late eighteenth and early nineteenth centuries, during the Industrial Revolution, pioneers could migrate to uninhabited territory and cultivate the land. Sparsely inhabited land suitable for agriculture was available in western North America, central Russia, and Argentina's pampas.

Two centuries ago, people believed that good agricultural land would always be available for willing pioneers. Today few scientists believe that further expansion of agricultural land can feed the growing world population. At first glance, new agricultural land appears to be available because only 12 percent of the world's land area is currently used to grow crops, according to the United Nations. Another 25 percent of the world's land area is permanent meadows and pastures. However, in recent decades, population has increased much more rapidly than agricultural land, which has remained virtually unchanged (Figure 10-63). Food production has increased more rapidly than population because of greater productivity, as discussed earlier in the chapter.

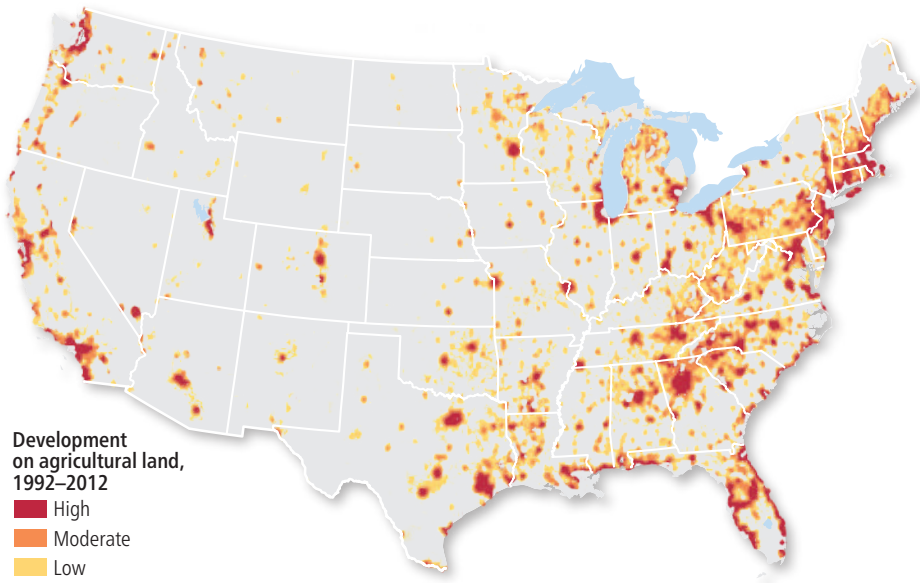


▲ **FIGURE 10-63 WORLD POPULATION GROWTH, AGRICULTURAL LAND, AND FOOD PRODUCTION**

Loss of Land to Urbanization

The von Thünen model (refer to Figure 10-37) shows the influence of proximity to urban markets in the form of agriculture practiced on a piece of land. The expansion of urban areas has contributed to reducing agricultural land.

Loss of farmland to urban growth is especially severe at the edge of the string of large metropolitan areas along the East Coast of the United States. As urban areas grow in population and land area, farms on the periphery are replaced by urban land uses. The United States has been losing 770,000 hectares (1.9 million acres) of farmland annually. Much of it is the most productive farmland, known as prime agricultural land, as urban areas sprawl into the surrounding countryside (Figures 10-64 and 10-65).



▲ **FIGURE 10-64 LOSS OF AGRICULTURAL LAND TO URBAN DEVELOPMENT, 1992-2012**

▶ **FIGURE 10-65 URBAN DEVELOPMENT ENCROACHES ON FARMLAND** Perrysburg, Ohio.

Agriculture & Water

Agriculture is also threatened by insufficient water needed to grow crops. It takes a lot of water to produce many of the foods that we eat (Table 10-2).

California and neighboring states in the U.S. Southwest have grown rapidly despite limited supplies of water. California's limited water supply comes from two main sources:

- Surface water, which is water that travels or gathers on the ground, such as in rivers, streams, and lakes.
- Groundwater, which is water that is pumped out from the ground.

Much of the land used for agriculture in California does not get enough rainfall even in normal times to grow crops. An extended drought in recent years has stressed California's agriculture as well as its residents. After several years of drought, the volume of water in California's rivers, streams, and lakes has been severely reduced. In normal years, 70 percent of California's water comes from surface water, but after several years of drought, the share dropped to 40 percent.

California farmers produce one-third of U.S. vegetables and two-thirds of fruits and nuts. It takes a lot of water to grow these fruits and vegetables. Agriculture consumes 80 percent of the state's distributed water. The counties with the highest per capita use of water are the major agricultural counties. In eating fruits and vegetables, when factoring in the amount of water to produce those foods, the average American consumes around 40 gallons of California water per day.

TABLE 10-2 | Amount of Water Needed to Grow Selected Foods

Foods	Gallons
Steak (6 ounces)	674
Hamburger (bun, meat, lettuce, tomato)	660
1 egg	52
Soda (1 can)	46
Salad (lettuce, tomato, cucumber)	21

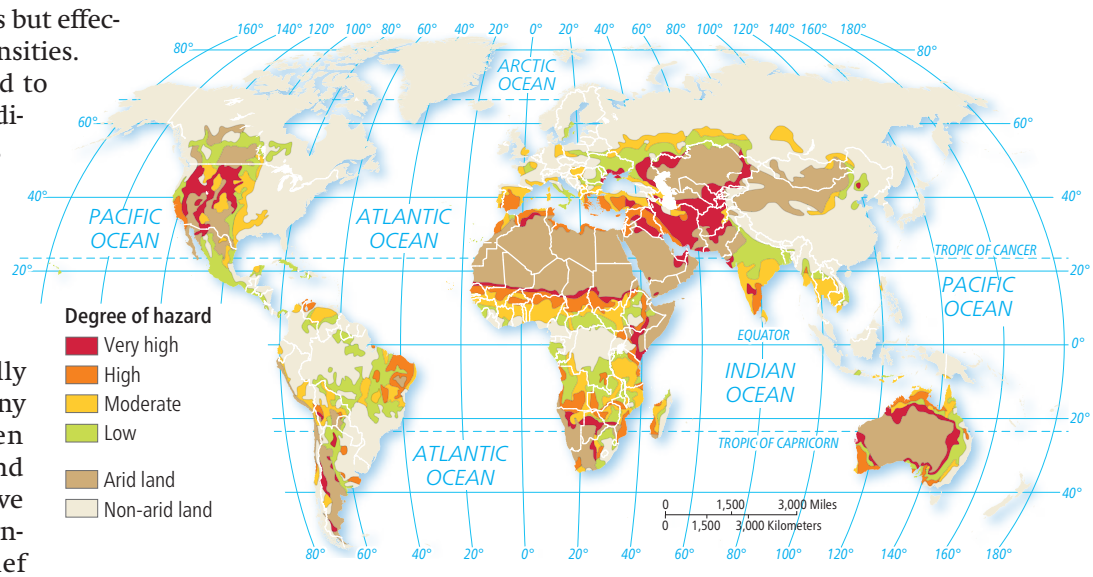
Desertification

In some semiarid regions, agricultural practices contribute to a loss of soil moisture and protective plant cover, allowing deserts to spread. A lack of water pushes many people from their land. For example, hundreds of thousands have been forced to move from the Sahel region of northern Africa because of drought conditions. The people of the Sahel have traditionally been pastoral nomads, a form of agriculture adapted to dry lands but effective only at low population densities. Human actions that cause land to deteriorate to a desertlike condition are called **desertification**, or more precisely semiarid land degradation. The capacity of the Sahel to sustain human life – never very high – has declined recently because of population growth and several years of unusually low rainfall. Consequently, many of these nomads have been forced to move into cities and rural camps, where they survive on food donated by the government and international relief organizations.

Semiarid lands that can support only a handful of pastoral nomads are overused because of rapid population growth. Excessive crop planting, animal grazing, and tree cutting exhaust the soil's nutrients and preclude agriculture. The Earth Policy Institute estimates that 2 billion hectares (5 million acres) of land have been degraded around the world (Figure 10-66). Overgrazing is thought to be responsible for 34 percent of the total, deforestation for 30 percent, and agricultural use for 28 percent. The U.N. estimates that desertification removes 27 million hectares (70 million acres) of land from agricultural production each year, an area roughly equivalent to the size of Colorado.

Excessive water threatens other agricultural areas, especially drier lands that receive water from human-built irrigation systems. If the irrigated land has inadequate drainage, the underground water level rises to the point where roots become waterlogged. The U.N. estimates that 10 percent of all irrigated land is waterlogged, mostly in Asia and South America. If the water is salty, the plants may be damaged by the salt. The ancient civilization of Mesopotamia may have collapsed in part because of waterlogging and excessive salinity in its agricultural lands near the Tigris and Euphrates rivers.

Pause & Reflect 10.4.2 Have you seen loss of farmland near where you live? For what new purpose is the land used?



▲ **FIGURE 10-66 DESERTIFICATION (SEMIARID LAND DEGRADATION)**

Applying Biotechnology to Agriculture

Learning Outcome 10.4.3 Discuss the debate over the planting of GMO seeds.

One of the most challenging issues in contemporary agriculture is the extent to which genetically modified seeds should be planted. Farmers have been manipulating crops and livestock for thousands of years. The very nature of agriculture is to deliberately manipulate nature. Humans control selective reproduction of plants and animals in order to produce a larger number of stronger, hardier survivors.

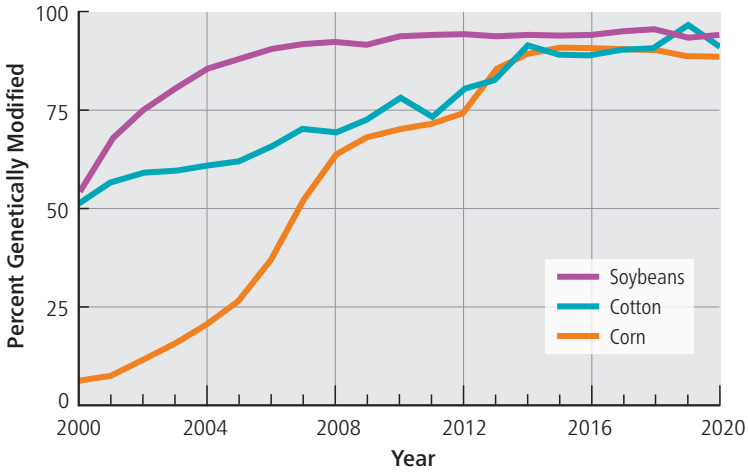
Beginning in the nineteenth century, the science of genetics expanded understanding of how to manipulate plants and animals to secure dominance of the most favorable traits. However, genetic modification, which became widespread in the late twentieth century, marks a sharp break with the agricultural practices of the past several thousand years. Today, the genetic composition of an organism is not merely studied, it is actually altered.

Genetically Modified Organisms

A **genetically modified organism (GMO)** is a living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology. A GMO mixes genetic material of two or more species that would not otherwise mix in nature. GMO seeds are genetically modified to survive when herbicides and insecticides are sprayed on fields to kill weeds and insects. These seeds are known as "Roundup-ready" seeds because their creator, Monsanto, sold its weed killers under the brand name Roundup.

Worldwide, 190 million hectares – 12 percent of all farmland – was devoted to genetically modified crops in 2019; 74 percent of the world's soybeans, 80 percent of cotton, and 31 percent of maize were genetically modified in 2019. Genetic modification is especially widespread in the United States: 94 percent of soybeans, 96 percent of cotton, and 92 percent of maize; usage increased rapidly during the first decade of the twenty-first century (Figure 10-67). Three-fourths of the processed food that Americans consume has at least one genetically modified ingredient. The United States was responsible for 38 percent of the world's genetically modified crops, and Latin American countries (primarily Brazil and Argentina) were responsible for 44 percent.

The United States has urged developing countries, especially in sub-Saharan Africa, to increase their food supply in part through increased use of GMOs. Africans are divided on whether to accept GMOs. The positives of genetic modification are higher yields, increased nutrition, and more resistance to pests. Genetically modified foods are also better tasting to some palates. Despite these benefits, opposition to GMOs is strong in Africa, as well as in Europe, for several reasons (Figure 10-68):



▲ **FIGURE 10-67 GENETICALLY MODIFED CROPS IN THE UNITED STATES**

- **Health problems.** Consuming large quantities of genetically modified foods may reduce the effectiveness of antibiotics and could destroy long-standing ecological balances in local agriculture.
- **Export problems.** European countries, the main markets for Africa's agricultural exports, require genetically modified foods to be labeled. Europeans are especially strongly opposed to GMOs because they believe genetically modified food is not as nutritious as food from traditionally bred crops and livestock. Because European consumers shun genetically modified food, African farmers fear that if they are no longer able to certify their exports as being not genetically modified, European customers will stop buying them.
- **Increased dependence on the United States.** U.S.-based transnational corporations manufacture most of the GMO seeds. Africans fear that the biotech companies could – and would – introduce a so-called "terminator" gene in the GMO seeds to prevent farmers from replanting them after harvest and require them to continue to purchase seeds year after year from the transnational corporations.

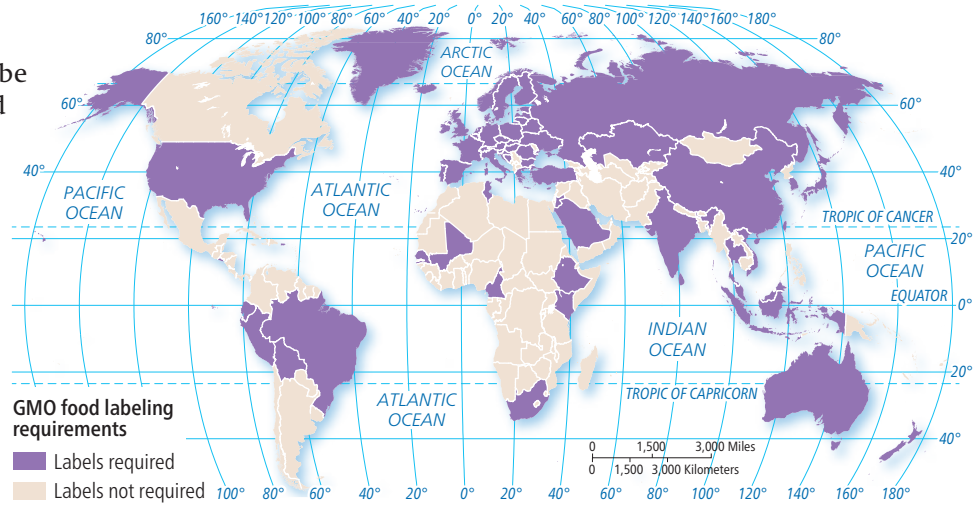
▲ **FIGURE 10-68 RALLY OPPOSING GMO CROPS** Toulouse, France.

GMO Labeling

Many countries require that GMOs be labeled (Figure 10-69). In the United States, food manufacturers, importers, and retailers were required beginning in 2022 to identify food that has been genetically modified. Identification on the package takes the form of a label, a symbol created by the USDA, or a quick response (QR) code linking to an informational website.

The U.S. Congress passed the National Bioengineered Food Disclosure Law in 2016, directing the U.S. Department of Agriculture (USDA) to establish a national standard for disclosing foods that are or may be bioengineered. The USDA standard defines bioengineered foods as "those that contain detectable genetic material that has been modified through certain lab techniques and cannot be created through conventional breeding or found in nature." By using the term *bioengineered* instead of the more familiar *GMO*, critics charge that the regulations are confusing, especially the need to use a QR code to access information.

Instead of searching for information about a GMO, consumers in the United States can look instead for a label that assures that the product is GMO-free. The Non-GMO Project is a nonprofit organization with technical professionals who verify that a product is GMO-free (Figure 10-70).



▲ **FIGURE 10-69 COUNTRIES THAT REQUIRE GMO LABEL**
Source: Center for Food Safety.

Sustainable Food Choices

Choices to consume specific foods are made several times a day. These choices can be more or less sustainable.

Meat or Vegetarian/Vegan. Around 8 percent of people in the world are vegetarian. The percentage varies widely by country. For example, more than 30 percent of people in India identify as vegetarians, compared with only 5 percent in the United States, which has one of the highest rates of meat consumption per capita. Meat is a great source of zinc, iron, and other omega-3s that are important for muscle development and health. On the other hand, meat consumption is associated with chronic illnesses, including hypertension, cancer, and cardiovascular disease.

Global Sources or Local Sources. Most food in developed countries like the United States travels long distances to reach supermarkets and restaurants. At the same time, more people are patronizing farmers markets and "farm-to-table" restaurants where locally produced foods are the mainstay. Consuming globally makes it easier to eat a balanced diet and obtain food that can't be grown locally (Figure 10-71).

Pause & Reflect 10.4.3 Does your family avoid foods made with GMO seeds? Why or why not?

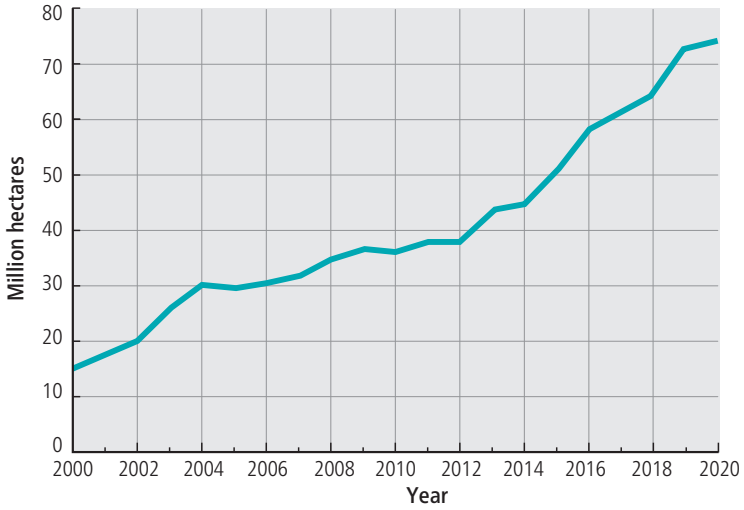
▲ **FIGURE 10-70 LABEL VERIFYING THAT THE PRODUCT IS NON-GMO**

▼ **FIGURE 10-71 GLOBAL SOURCING** Most bananas sold in the United States are grown in Central America or Caribbean islands.

Sustainable Farming

Learning Outcome 10.4.4 Identify principles of organic farming and sustainable land management.

As the world as a whole is experiencing an increase in food production, overall demand for food has remained constant in developed countries because of low population growth and saturation of the market for most products. The most rapid growth in demand has been for organic food, including non-GMO food. Some consumers in developed countries are questioning the health risks in consuming biotech food produced through heavy application of chemicals as well as the long-term adverse environmental impacts for agriculture.



▲ **FIGURE 10-72 ORGANIC FARMLAND WORLDWIDE**

Organic Farming

Organic agriculture is farming that depends on the use of naturally occurring substances while prohibiting or strictly limiting synthetic substances, such as herbicides, pesticides, and growth hormones. Worldwide, organic farming was practiced on around 75 million hectares (185 million acres), or 1 percent, of farmland, as of 2020 (Figure 10-72). Australia was the leader, with 36 million hectares (89 million acres), or 48 percent of the worldwide total (Figure 10-73). Argentina was a distant second, with 4 percent of the world total, and the United States was eighth, with 2 percent of the world total. USDA economists reported that organic food sales spiked from $3 billion in 1997 to $52 billion in 2020. Organic food accounted for 4 percent of food purchases in the United States in 2022, compared with less than 1 percent in 1997.

Organic farming is sensitive to the complexities of biological and economic interdependencies between crops and livestock. Growing crops and raising livestock is integrated as much as possible at the level of the individual farm. This integration reflects a return to the historical practice of mixed crop and livestock farming, in which growing crops and raising animals were regarded as complementary activities on the farm. This was the common practice for centuries, until the mid-1900s, when technology, government policy, and economics encouraged farmers to become more specialized.

In organic farming, crops are grown without application of **herbicides** and **pesticides** to control weeds. GMO seeds are not used. In organic farming, animals consume crops grown on the farm and are not confined to small pens. The moral and ethical debate over animal welfare is particularly intense regarding confined livestock production systems. Confining livestock leads to surface water and groundwater pollution, particularly where the density of animals is high. If animals are not confined, manure can contribute to soil fertility.

In organic farming, antibiotics are administered to animals only for therapeutic purposes. Many conventional livestock farms have fed animals antibiotics to foster weight gain. The European Union has banned the use of antibiotics in livestock for reasons other than medical. The United States has permitted the practice, but the U.S. Food and Drug Administration has ordered the practice to be phased out.

▼ **FIGURE 10-73 ORGANIC FREE RANGE CHICKENS** Clarkefield, Australia.

Sustainable Land Management

In the U.S. Midwest, farm fields are more likely to be damaged by too much precipitation than by drought. Heavy rains can wash away the protective layer of high-quality top soil and deposit it in bodies of water. After harvesting, conventional farming clears away crop residue, such as corn stalks. The soil is churned up or tilled before the next year's seeds are planted. This practice loosens the soil particles, making them susceptible to being washed away by rain or blown away by wind.

Conservation tillage is a method of soil cultivation that reduces soil erosion and runoff. Under conservation tillage, some or all of the previous harvest is left on the fields through the winter. **No tillage**, as the name implies, leaves all of the soil undisturbed, and the entire residue of the previous year's harvest is left untouched on the fields (Figure 10-74). **Ridge tillage** is a system of planting crops on ridge tops. Crops are planted on 10- to 20-centimeter (4- to 8-inch) ridges that are formed during cultivation or after harvest. A crop is planted on the same ridges, in the same rows, year after year.

Dirty Dozen & Clean Fifteen. The Environmental Working Group ranks several dozen types of produce according to level of pesticides, based on tests conducted by the U.S. Department of Agriculture. The 12 most pesticide-contaminated fruits and vegetables are called "the Dirty Dozen," and the 15 least contaminated are "the Clean Fifteen." Strawberries, spinach, and kale have been found to be the most contaminated, whereas avocados, corn on the cob, and pineapple are the least contaminated (Figure 10-75).

Government Policies

In many countries, government policies have aggravated food supply, cost, and distribution problems. To make food affordable for urban residents, some governments keep agricultural prices low. Constrained by price controls, farmers are unable to sell their commodities at a profit and therefore have little incentive to increase production.

▼ **FIGURE 10-74 CONSERVATION TILLAGE** Soybean field, Iowa.

▲ **FIGURE 10-75 DIRTY DOZEN** Strawberries are ranked as the most pesticide-contaminated fruit.

The U.S. government has three agriculture policies designed to improve the financial position of farmers:

- Farmers are encouraged to avoid crops that are in excess supply. Because soil erosion is a constant threat, the government encourages planting fallow crops, such as clover, to restore nutrients to the soil and to help hold the soil in place. These crops can be used for hay or forage for pigs, or to produce seeds for sale.
- The government pays farmers when certain commodity prices are low. The government sets a target price for a commodity and pays farmers the difference between the price they receive in the market and the target price set by the government as a fair level for the commodity. The target prices are calculated to give farmers the same price for the commodity today as in the past, when compared to other consumer goods and services.
- The government buys surplus production and sells or donates it to foreign governments. In addition, low-income Americans receive food stamps in part to stimulate their purchase of additional food.

The United States has averaged about $20 billion a year on farm subsidies in recent years. Subsidy payments are lower in years when market prices rise and production is down, typically as a result of poor weather conditions in the United States or political problems in other countries.

More farmers receive subsidies in Europe, and they receive more than American farmers. The high subsidies are a legacy of a long-standing commitment by the European Union to maintain agriculture in its member states, especially in France. Supporters point to the preservation of rural village life in parts of Europe, while critics charge that the subsidies create needlessly high food prices.

Government policies in developed countries point out a fundamental irony in worldwide agricultural patterns: In developed regions such as North America and Europe, farmers are encouraged to grow less food, whereas developing countries struggle to increase food production to match the rate of growth in the population.

Pause & Reflect 10.4.4 Does your family go out of its way to get local or organic food? Why or why not?

10 Summary & Review

KEY ISSUE

10.1 | Why Do People Consume Distinctive Foods?

- Most food is consumed in the form of cereal grains, especially wheat, rice, and maize.
- People in developed countries consume more total calories and a higher percentage through animal products.
- Most humans consume more than the recommended minimum calories, but undernourishment is still common in Asia and sub-Saharan Africa.

KEY ISSUE

10.2 | Where Did Agriculture Originate?

- Before the invention of agriculture, most humans were hunters and gatherers.
- Agriculture was invented in multiple hearths beginning approximately 10,000 years ago.
- Modern agriculture is divided between subsistence agriculture in developing countries and commercial agriculture in developed countries. They differ according to the percentage of farmers, use of machinery, and farm size.

KEY ISSUE

10.3 | Where Is Agriculture Distributed?

- Agriculture can be divided into 11 major regions, including five subsistence and six commercial regions.
- In commercial regions, mixed crop and livestock is the most common form of agriculture. Dairy, commercial gardening, grain, Mediterranean, and livestock ranching are also important.
- In regions of subsistence farming, pastoral nomadism is prevalent in drylands, shifting cultivation in tropical forests, and intensive subsistence in regions with high population concentrations.

KEY ISSUE

10.4 | Why Do Farmers Face Sustainability Challenges?

- International trade in food is increasing, but in some places at the expense of producing food for domestic consumption.
- Agricultural land is being lost to competing uses, such as urbanization.
- The green revolution has improved the productivity of farming in some countries.
- GMO crops are increasingly planted in some countries, as are organic crops.

Thinking Geographically

KEY ISSUE

10.1 | Why Do People Consume Distinctive Foods?

Pizza is the most popular food in the United States. Is it a favorite for you and your family? What are the principal ingredients in your favorite pizza? Are these ingredients grown locally, or are they imported?

▲ FIGURE 10CR-1 EATING PIZZA, LONDON

KEY ISSUE

10.2 | Where Did Agriculture Originate?

How does the diffusion of agriculture compare with the diffusion of the Indo-European language family (refer to Figures 5-18, 5-19, and 10-12)? What might account for similarities and differences in the two distributions?

▲ FIGURE 10CR-2 ORIGIN OF INDO-EUROPEAN: SEDENTARY FARMER THEORY, ANATOLIA (PRESENT-DAY TÜRKIYE)

KEY ISSUE

10.3 | Where Is Agriculture Distributed?

Review the concept of overpopulation (the number of people in an area exceeding the capacity of the environment to support life at a decent standard of living). What agricultural regions have relatively limited capacities to support intensive food production? Which of these regions face rapid population growth? (Refer to Figure 2-18 to see where population is increasing the most.)

▲ FIGURE 10CR-3 PASTORAL NOMADS, MONGOLIA

KEY ISSUE

10.4 | Why Do Farmers Face Sustainability Challenges?

What might be some of the obstacles to introducing or expanding organic food service at your university or school?

▲ FIGURE 10CR-4 SALAD BAR, UNIVERSITY OF CALIFORNIA, BERKELEY

Key Terms

Agribusiness Commercial agriculture characterized by the integration of different steps in the food-processing industry.

Agriculture The deliberate effort to modify a portion of Earth's surface through the cultivation of crops and the raising of livestock.

Aquaculture (or **aquafarming)** The cultivation of seafood under controlled conditions.

Bid-rent curve A model showing that the amount a farmer is willing to pay for land declines with increasing distance from the market.

Cash crop A crop that is grown for sale rather than for the farmer's own use.

Cereal grain A grass that yields grain for food.

Columbian Exchange The transfer of plants and animals, as well as people, culture, and technology, between the Western Hemisphere and Europe, as a result of European colonialization and trade.

Commercial agriculture Agriculture undertaken primarily to generate products for sale off the farm.

Commercial gardening Agriculture focusing on the production of fruits, vegetables, and other horticulture.

Conservation tillage A method of soil cultivation that reduces soil erosion and runoff.

Crop A plant cultivated by people.

Crop rotation The practice of rotating use of different fields from crop to crop each year to avoid exhausting the soil.

Dairy farm A form of commercial agriculture that specializes in the production of milk and other dairy products.

Desertification (also known as semiarid land degradation) Degradation of land, especially in semiarid areas, primarily because of human actions such as excessive crop planting, animal—grazing, and tree cutting.

Dietary energy consumption The amount of food that an individual consumes, measured in kilocalories (Calories in the United States).

Double cropping Harvesting twice a year from the same field.

First agricultural revolution The process that began when human beings first domesticated plants and animals and no longer relied entirely on hunting and gathering.

Fishing The capture of wild fish and other seafood living in the waters.

Food security Physical, social, and economic access at all times to safe and nutritious food sufficient to meet dietary needs and food preferences for an active and healthy life.

Genetically modified organism (GMO) A living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology.

Grain Seed of a cereal grass.

Green revolution (see **third agricultural revolution**).

Herbicide A chemical used to control unwanted plants.

Horticulture Growing of fruits, vegetables, flowers, and tree crops.

Intensive subsistence agriculture A form of subsistence agriculture in Asia's major population concentrations in which farmers expend a large amount of effort to produce the maximum feasible yield from a parcel of land.

Milkshed The area surrounding a city from which milk is supplied.

Mixed crop and livestock farming Commercial farming characterized by integration of crops and livestock; most of the crops are fed to animals rather than consumed directly by humans.

Monocropping The practice of growing the same, single crop year after year.

No tillage A farming practice that leaves the soil undisturbed and the entire residue of the previous year's harvest left untouched on the fields.

Organic agriculture Farming that depends on the use of naturally occurring substances while prohibiting or strictly limiting synthetic substances, such as herbicides, pesticides, and growth hormones.

Overfishing Capturing fish faster than they can reproduce.

Paddy The Malay word for "wet rice"; increasingly used to describe a flooded field.

Pastoral nomadism A form of subsistence agriculture based on herding domesticated animals.

Pesticide A substance to control pests, including weeds.

Plantation A large farm in a developing country that specializes in the production of one or two crops for sale.

Ranching A form of commercial agriculture in which livestock graze over an extensive area.

Ridge tillage A system of planting crops on ridge tops in order to reduce farm production costs and promote greater soil conservation.

Sawah A flooded field for growing rice.

Second agricultural revolution An increase in agricultural productivity through improvement of crop rotation and breeding of livestock.

Shifting cultivation A form of subsistence agriculture in which people shift activity from one field to another; each field is used for crops for a relatively few years and left fallow for a relatively long period.

Subsistence agriculture Agriculture designed primarily to provide food for direct consumption by the farmer and the farmer's family.

Third agricultural revolution (or **green revolution)** Rapid diffusion of new agricultural technology, especially new high-yield seeds and fertilizers.

Transhumance Seasonal migration of livestock between mountain and lowland pasture area.

Truck farming Commercial gardening, so named for the Middle English word *truck*, meaning "barter" or "exchange of commodities."

Undernourishment Dietary energy consumption that is continuously below the minimum requirement for maintaining a healthy life and carrying out light physical activity.

Wet rice Rice planted on dry land in a nursery and then moved to a deliberately flooded field to promote growth.

International Geographic Mapping Explorations

A World of Food Production

Food is grown in many different ways around the world. One of the most distinctive agriculture regions is Mediterranean. We get grapes, olives, and dates from the Mediterranean agriculture region. Spain, Italy, and Greece rank among the world leaders in olive production.

FIGURE 10CR-5 HARVESTING KALAMATA OLIVES, GREECE

. . . . Subsistence agriculture remains an important source of food for people in many developing countries. But the percentage of people who practice subsistence agriculture in developing countries is declining. Instead, an increasing number of people in developing countries work in factories, as we will see in the next chapter, Industry. . . .

11 Industry

KEY ISSUES

11.1 Where Are Industries Distributed?

Industries are clustered in three regions: Europe, East Asia, and North America. Europe was the first region to industrialize, and East Asia is the fastest growing.

11.2 Why Are Site Factors Important for Industries?

Site factors are related to the costs of production inside a factory. The three site factors that may vary among locations are labor, land, and capital.

11.3 Why Are Situation Factors Important for Industries?

Situation factors involve transporting materials to and from a factory. Some industries locate factories near inputs, whereas others choose locations near markets.

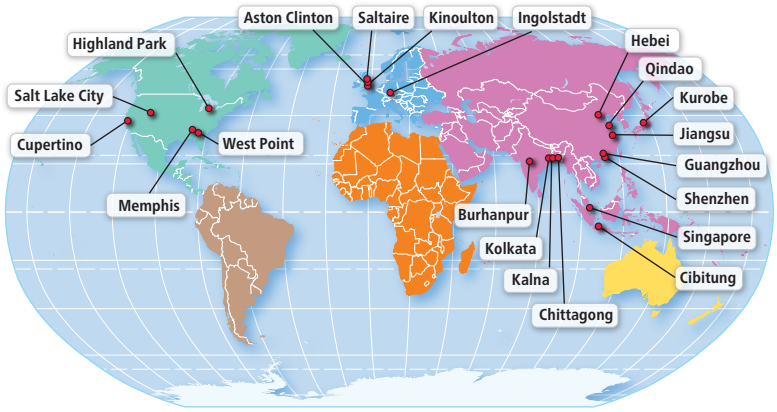
11.4 Why Has the Distribution of Industries Changed?

Manufacturing is increasing in some developing countries, especially those attracted by low-wage labor. Industry is also changing locations within developed countries.

▶ Textile factory, Dhaka, Bangladesh.

Industry was once highly clustered in only a few communities within a handful of developed countries. But industry has diffused to many communities in many developing countries. Communities around the world view manufacturing jobs as a special asset. They mourn when factories close and rejoice when new ones open.

LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

11.1 | Where Are Industries Distributed?

Industry, the title of this chapter, refers to the manufacturing of goods in a factory. The word *industry* is appropriate because it also means persistence or diligence in creating value. A factory utilizes a large number of people as well as considerable machinery and money to turn out valuable products.

Industry & Geography

Learning Outcome 11.1.1 Summarize the causes of the Industrial Revolution.

The hearth of modern industry—meaning the place where manufacturing of goods in a factory began—was in the United Kingdom, specifically northern England and southern Scotland during the second half of the eighteenth century. From that hearth, industry diffused to other European regions and to North America in the nineteenth century and to still more regions globally in the twentieth century.

The Industrial Revolution

The Industrial Revolution was defined in Chapter 2 as a series of improvements in industrial technology that transformed the process of manufacturing goods. Prior to the Industrial Revolution, manufacturing was geographically dispersed across the landscape. People made household tools and agricultural equipment in their own homes or obtained them in the local village. Home-based manufacturing was known as the **cottage industry** system.

The catalyst of the Industrial Revolution was technology, and several inventions transformed the way in which goods were manufactured. The invention most important to the development of factories was the steam engine, patented in 1769 by James Watt, a maker of mathematical instruments in Glasgow, Scotland. The large supply of power available from a Watt steam engine induced firms to concentrate every step in the production in one building attached to a single power source.

The revolution in industrial technology created an unprecedented expansion in productivity and ultimately resulted in substantially higher standards of living. For example, the Industrial Revolution was cited in Chapter 2 as a principal cause of population growth in stage 2 of the demographic transition.

Watt's engine and other inventions enabled the United Kingdom to become the world's dominant industrial and economic power during the nineteenth century.

The term *Industrial Revolution* is somewhat misleading:

- The transformation was far more than industrial; it resulted in new social, economic, and political inventions, not just industrial ones.
- The changes involved a gradual diffusion of new ideas and techniques over decades rather than an instantaneous revolution.

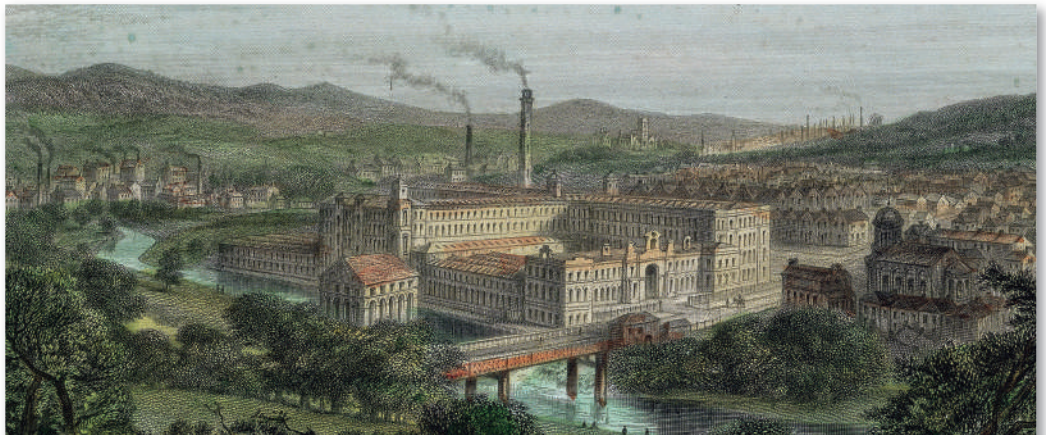
Nonetheless, the term is commonly used to define the process that began in the United Kingdom in the late 1700s.

Among the first industries impacted by the Industrial Revolution were:

- **Iron.** The first industry to benefit from Watt's steam engine was the iron tool industry. The usefulness of iron had been known for centuries, but it was difficult to produce because ovens had to be constantly heated, which was difficult before the steam engine.
- **Textiles.** Textile production was transformed from a dispersed cottage industry to a concentrated factory system during the late eighteenth century. In 1768, Richard Arkwright, a barber and wigmaker in Preston, England, invented machines to untangle cotton prior to spinning. Too large to fit inside a cottage, spinning frames were placed inside factories near sources of rapidly flowing water, which supplied the power (Figure 11-1).
- **Chemicals.** The chemical industry was created to bleach and dye cloth. In 1746, John Roebuck and Samuel Garbett established a factory to bleach cotton with sulfuric acid obtained from burning coal. When combined with various metals, sulfuric acid produced another acid called *vitriol*, used for dyeing clothing.
- **Food processing.** In 1810, French confectioner Nicolas Appert started canning food in glass bottles that had been sterilized in boiling water. Canned food helped to feed the factory workers who no longer lived on farms.

Pause & Reflect 11.1.1 How would each of the major industries first impacted by the Industrial Revolution have affected the everyday lives of ordinary people?

▼ **FIGURE 11-1 NINETEENTH CENTURY FACTORY** Saltaire, England, is a textile factory and surrounding town founded by Sir Titus Salt in 1851.



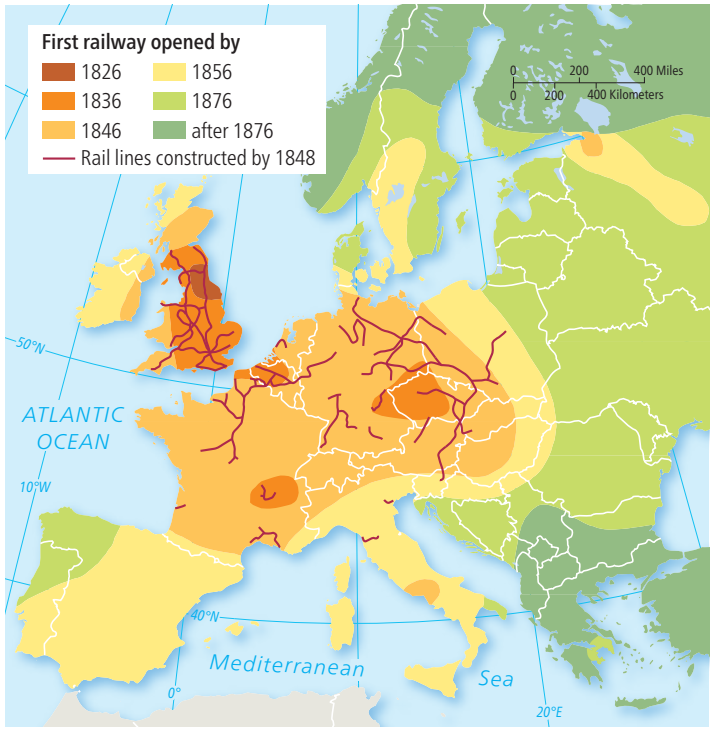
The Industrial Revolution & Transportation

Transportation improvements played a critical role in diffusing the Industrial Revolution from its hearth in the United Kingdom (Figures 11-2 and 11-3). First canals and then railroads enabled factories to attract large numbers of workers, bring in bulky raw materials such as iron ore and coal, and ship finished goods to consumers.

Industrial Clusters

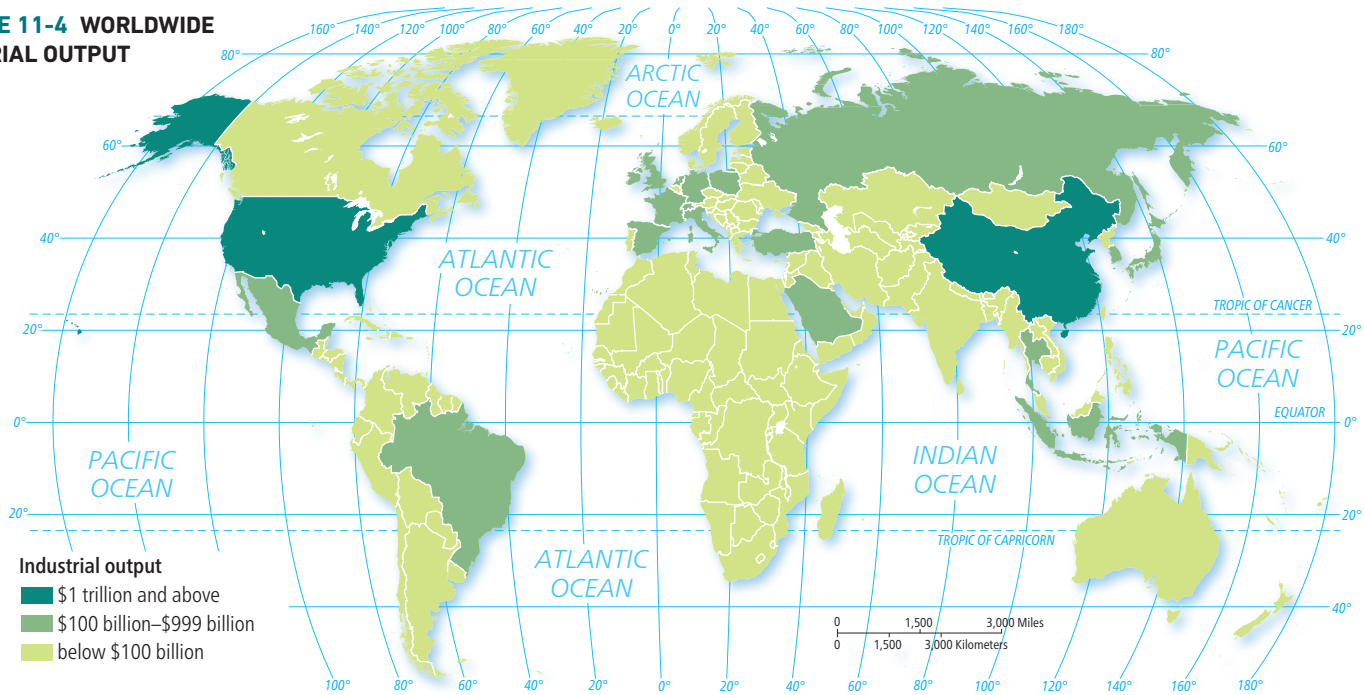
Industry is not distributed uniformly around the world. Rather, it is concentrated in three of the nine world regions discussed in Chapter 9: Europe, North America, and East Asia. Two-thirds of the world's industrial output is clustered in these three regions (Figure 11-4).

▲ **FIGURE 11-2 TRANSPORTATION HEARTH: THE WORLD'S FIRST RAILWAY** The Stockton & Darlington Railway opened in the north of England in 1825. When the railway's centennial was observed in 1925, the original locomotive and cars from 1825 were brought from a museum to run on the original route. This is a colorized version of a black-and-white photo of the 1925 parade.



▲ **FIGURE 11-3 DIFFUSION OF THE INDUSTRIAL REVOLUTION** The construction of railroads in the United Kingdom and on the European continent reflects the diffusion of the Industrial Revolution. Europe's political problems impeded the diffusion of the railroad for many years. Cooperation among small neighboring states was essential to build an efficient rail network and to raise money for constructing and operating the system. Because such cooperation could not be attained, railroads in some parts of Europe were delayed 50 years after their debut in the United Kingdom.

▶ **FIGURE 11-4 WORLDWIDE INDUSTRIAL OUTPUT**



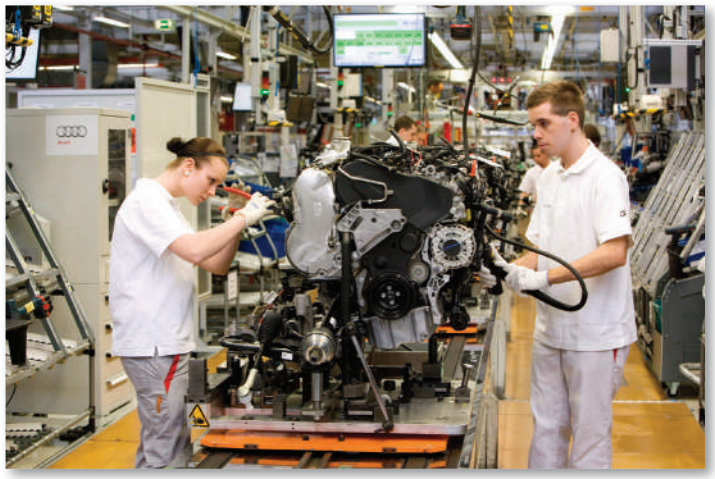
Industrial Regions

Learning Outcome 11.1.2 Describe the locations of the three principal industrial regions.

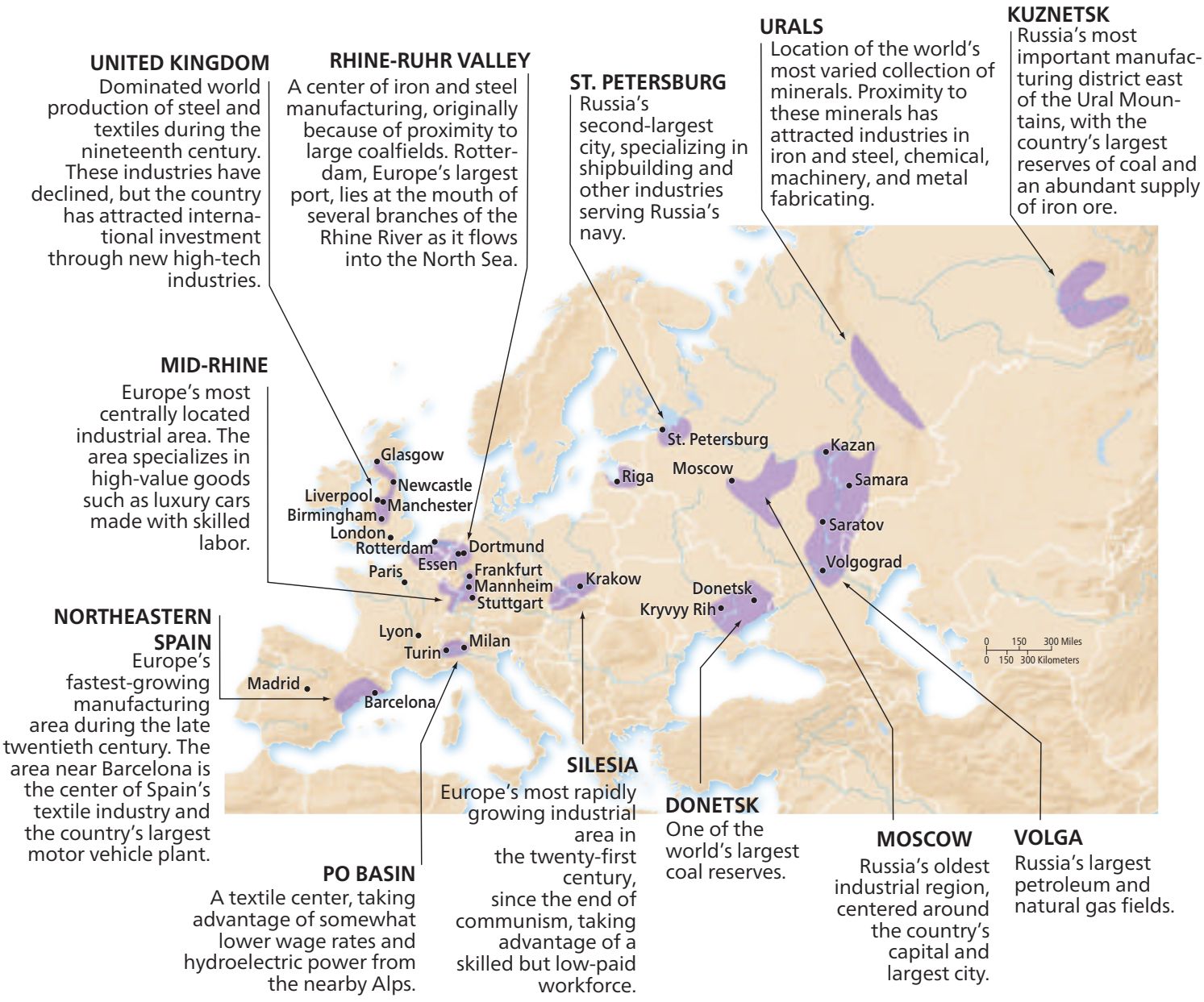
The world's three principal industrial regions are Europe, North America, and East Asia. Each of the three regions has numerous subareas that specialize in various forms of industry, depending on their particular geographic assets.

Europe: Industrial Birthplace

Europe was the first region to industrialize, during the nineteenth century. Numerous industrial centers emerged in Europe as countries competed with each other for supremacy (Figure 11-5 and Figure 11-6).



▲ **FIGURE 11-6 AUDI ENGINE PLANT** Ingolstadt, Germany.



▲ **FIGURE 11-5 EUROPE'S INDUSTRIAL AREAS**

North America: Industrial Leader

Industry arrived a bit later in North America than in Europe, but it grew much faster in North America than in Europe during the nineteenth century. North America's manufacturing was traditionally highly concentrated in the northeastern United States and southeastern Canada (Figure 11-7). In recent years, manufacturing has relocated to the South, lured by lower wages and legislation that has made it difficult for unions to organize factory workers.

East Asia: The New Industrial Leader

East Asia became an important industrial region in the second half of the twentieth century, beginning with Japan. Into the twenty-first century, China has emerged as the world's leading manufacturing country by most measures (Figure 11-8).

Pause & Reflect 11.1.2 Compare the world's principal industrial areas with population distribution (Figure 2-7). Are industrial areas generally in regions of high population density or low? Why?

FIGURE 11-7 NORTH AMERICA'S INDUSTRIAL AREAS

SOUTHEASTERN ONTARIO
Canada's most important industrial area, central to the Canadian and U.S. markets and near the Great Lakes and Niagara Falls.

MOHAWK VALLEY
Takes advantage of inexpensive electricity generated at nearby Niagara Falls.

NORTHERN CALIFORNIA
A leading center for social media, biotech, software, and electronic devices.

NEW ENGLAND
A cotton textile center in the early nineteenth century. Cotton was imported from southern states, and finished cotton products were shipped to Europe.

MIDDLE ATLANTIC
The largest U.S. market attracts industries that need proximity to a large number of consumers and depend on foreign trade through one of this region's large ports.

SOUTHERN CALIFORNIA
Now the country's largest area of clothing and textile production, the second-largest furniture producer, and a major food-processing center.

WESTERN GREAT LAKES
Centered on Chicago, the hub of the nation's transportation network and now the center of steel production.

PITTSBURGH–LAKE ERIE
The leading steel-producing area in the nineteenth century because of its proximity to Appalachian coal and iron ore.

JING-JIN-JI
The national capital region, including major centers of transportation equipment (aviation,automotive, shipping), logistics, and petrochemicals.

JAPAN
An industrial power since the 1950s and 1960s, initially by producing goods that could be sold in large quantities at cut-rate prices to consumers in other countries, now by manufacturing high-quality electronic products.

YANGTZE RIVER DELTA
China's most important industrial region, including biotechnology, metals, and chemicals.

PEARL RIVER DELTA
The leading center of electronics and high-tech industries.

SOUTH KOREA
Has followed Japan's lead in focusing on export-oriented manufacturers, such as cars, electronics, and steel. The country is a leading producer of oceangoing ships.

FIGURE 11-8 EAST ASIA'S INDUSTRIAL AREAS

Truck, Train, Boat, or Plane?

Learning Outcome 11.1.3 Explain why industries use different modes of transportation.

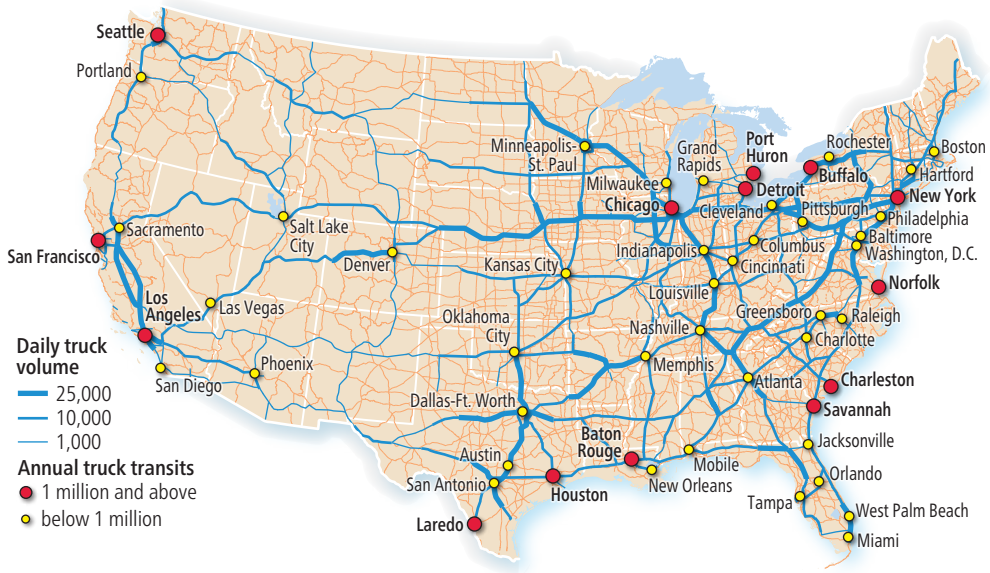
Industries transport their raw materials and products in one of four ways: truck, train, boat, or airplane. Firms seek the lowest-cost mode of transport, but which of the four alternatives is cheapest changes with the distance that goods are being sent.

Trucks: Short Distances. Trucks are most often used for short-distance delivery because they can be loaded and unloaded quickly and cheaply. Truck delivery is especially advantageous if the driver can reach the destination within one day, before having to stop for an extended rest (Figure 11-9).

Trains: Cross-Country Shipment. Trains are often used to ship to destinations that take longer than one day to reach, such as between the East and West coasts of the United States. Loading trains takes longer than loading trucks, but once underway, trains aren't required to make daily rest stops like trucks (Figure 11-10).

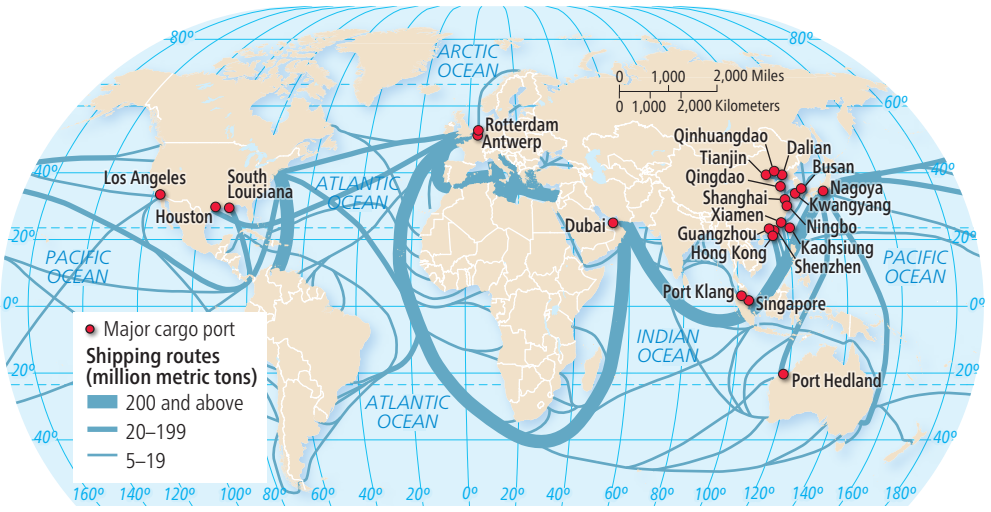
Airplanes: Small & Valuable Packages. Airplanes are the most expensive transport for all distances, so usually airplane shipping is reserved for speedy delivery of small-bulk, high-value packages.

Boats: Crossing Oceans. Ships are attractive for transport over very long distances because the cost per kilometer is very low. Ships are slower than land-based transportation, but unlike trains or trucks, ships can cross oceans, such as to North America from Europe or Asia (Figure 11-11).



▲ **FIGURE 11-9 SHIP BY TRUCK** The highest volumes of freight truck traffic in the United States are in the more densely populated eastern one-third of the country, where nearly two-thirds of Americans live.
Source: U.S. Department of Transportation

▲ **FIGURE 11-10 SHIP BY RAIL** Most rail moves long distances east-west within the United States.
Source: U.S. Department of Transportation



▶ **FIGURE 11-11 SHIP BY BOAT** The world's largest cargo ports and shipping routes are shown.
Source: American Association of Port Authorities

Break-of-Bulk Points

Mixed modes of delivery are often used. For example, air freight companies pick up packages in the afternoon and transport them by truck to the nearest airport. Late at night, planes filled with packages are flown to a central hub airport in the interior of the country, such as Memphis, Tennessee, or Louisville, Kentucky (Figure 11-12). The packages are transferred to other planes, flown to airports nearest their destination, transferred to trucks, and delivered the next morning.

Many companies that use multiple transport modes locate at a **break-of-bulk point**, which is a location where transfer among transportation modes is possible. Important break-of-bulk points include seaports and airports. For example, a steel mill in Gary, Indiana, may receive iron ore by ship via Lake Michigan and coal by train from Appalachia.

Containerization has facilitated transfer of packages between modes (Figure 11-13). Containers may be packed into a rail car, transferred quickly to a container ship to cross the ocean, and unloaded onto trucks at the other end. Large ships have been specially built to accommodate large numbers of rectangular box-like containers.

Regardless of transportation mode, cost rises each time inputs or products are transferred from one transport mode to another. For example, workers must unload goods from a truck and then reload them onto a plane. The company may need to build or rent a warehouse to store goods temporarily after unloading from one mode and before loading to another mode. Some companies may calculate that the cost of one mode is lower for some inputs and products, whereas another mode may be cheaper for other goods.

Just-in-Time Delivery

Just-in-time delivery is shipment of parts and materials to arrive at a factory moments before they are needed. Just-in-time delivery is especially important for delivery of inputs, such as parts and raw materials, to manufacturers of fabricated products, such as cars and computers.

Under a just-in-time system, parts and materials arrive at a factory frequently, in many cases daily or even hourly. Suppliers of the parts and materials are told a few days in advance how much will be needed over the next week or two, and first thing each morning, they are told exactly what will be needed at precisely what time that day. To meet a tight timetable, a supplier of parts and materials must locate factories near its customers. If given only an hour or two of notice, a supplier has no choice but to locate a factory within around one hour of the customer.

Just-in-time delivery reduces the money that a manufacturer must tie up in wasteful inventory. Manufacturers also save money through just-in-time delivery by reducing the size of the factory because space does not have to be wasted on piling up a mountain of inventory. Leading computer manufacturers have eliminated inventory altogether. They build computers only in response to customer orders placed primarily over the internet or by telephone.

Just-in-time delivery means that producers have lower inventory to cushion against disruptions in the arrival of needed parts. Five kinds of disruptions can result from reliance on just-in-time delivery:

- **Natural hazards.** Poor weather conditions can affect deliveries anywhere in the world. For example, blizzards can close highways, rail lines, and airports.
- **Traffic.** Deliveries may be delayed when traffic is slowed by an accident, construction, or unusually heavy volume.
- **Labor unrest.** A strike at one supplier plant can shut down the entire production within a couple days.
- **Health emergency.** The COVID-19 pandemic disrupted production and delivery of many items, such as computer chips.
- **National security.** Some essential inputs are disrupted by war, such as Russia's invasion of Ukraine. For example, those two countries are responsible for producing three-fourths of the world's sunflower oil, which is used to make cosmetics and diesel fuel as well as food products.

Pause & Reflect 11.1.3 How might weather conditions influence the choice of a factory site between the North and the South in the United States?

▲ **FIGURE 11-13 CONTAINERS LOADED ONTO A SHIP** Singapore.

▼ **FIGURE 11-12 BREAK-OF-BULK-POINT** FedEx air cargo hub, Memphis, Tennessee.

KEY ISSUE

11.2 | Why Are Site Factors Important for Industries?

Geographers try to explain why one location may be more profitable for a factory than others. A company ordinarily faces two geographic costs: site factors and situation factors.

Site factors are industrial location factors related to the costs of factors of production inside a plant. The three production factors that may vary among locations are labor, capital, and land.

Three Site Factors

Learning Outcome 11.2.1 Describe the three types of site factors.

Labor

The most important site factor on a global scale is labor. Minimizing labor costs is important for some industries, and the variation of labor costs around the world is large. The average wage paid to manufacturing workers is much higher in developed countries than in developing countries (Figure 11-14).

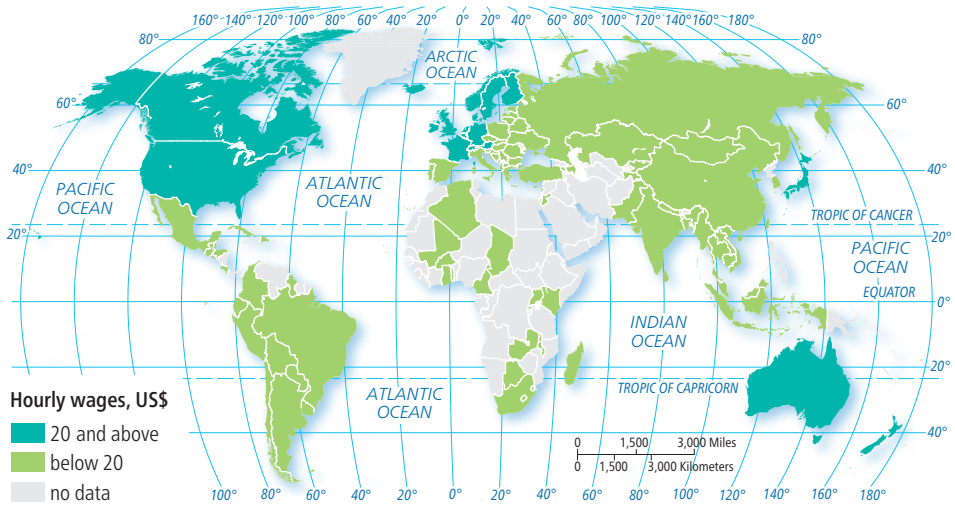
A **labor-intensive industry** is an industry in which wages and other compensation paid to employees constitute a high percentage of expenses. Labor constitutes an average of 11 percent of overall manufacturing costs in the United States, so a labor-intensive industry in the United States would have a much higher percentage than that. The reverse case, an industry with a much lower-than-average percentage of expenditures on labor, is considered capital intensive.

A labor-intensive industry is not the same as a high-wage industry. "Labor-intensive" is measured as a percentage, whereas "high-wage" is measured in dollars or other currencies. For example, motor-vehicle workers are paid much higher hourly wages than textile workers, yet the textile industry is labor intensive, and the auto industry is not. Although auto workers earn relatively high wages, most of the value of a car is accounted for by the parts and the machinery needed to put together the parts. On the other hand, labor accounts for a large percentage of the cost of producing a towel or shirt compared with materials and machinery.

Fordist & Post-Fordist Production. Traditionally, factories assigned each worker one task to perform repeatedly. Some geographers call this approach **Fordist production**, or mass production, because the Ford Motor Co. was one of the first companies to organize its production this way early in the twentieth century (Figure 11-15).

Many industries now follow a lean, or flexible, production approach. The term **post-Fordist production** is sometimes used to describe flexible production, in contrast with Fordist production. Post-Fordist production organizes workers into teams that perform a variety of tasks and solve problems through consensus. Manufacturing centers in North America and Europe still attract industries that depend on skilled labor. Increasingly, factory workers need skills such as computer literacy, and many now have college degrees.

Pause & Reflect 11.2.1 Labor accounts for around 5 percent of the cost of manufacturing a car. Does this mean that motor vehicle manufacturing is a labor-intensive industry?



▲ **FIGURE 11-14 HOURLY WAGES**

▼ **FIGURE 11-15 AUTO PRODUCTION, THEN & NOW** (a) Ford Motor Company, Dearborn, Michigan, 1913; (b) GAC factory, Guangzhou, China, 2019.

(a)

(b)

Capital

Manufacturers typically borrow capital – the funds to establish new factories or modernize existing ones. The U.S. motor-vehicle industry concentrated in Michigan early in the twentieth century largely because that region's financial institutions were more willing than eastern banks to lend money to the industry's pioneers.

The most important factor in the clustering of high-tech industries in California's Silicon Valley – even more important than proximity to skilled labor – has been the availability of capital (Figure 11-16). Financial institutions in Silicon Valley have long been willing to provide money for new software and communications firms, even though lenders elsewhere have hesitated. High-tech industries have been risky propositions – roughly two-thirds of them fail – but Silicon Valley financial institutions have continued to lend money to engineers who have good ideas so that they can buy the software, communications, and networks they need to get started. Around one-fifth of all capital invested in new industries in the United States goes to ones located in Silicon Valley.

The ability to borrow money has become a critical factor in the distribution of industry in developing countries. Financial institutions in many developing countries are short of funds, so new industries must seek loans from banks in developed countries. But enterprises may not get loans if they are located in a country that is perceived to have an unstable political system, a high-debt level, or ill-advised economic policies.

Land

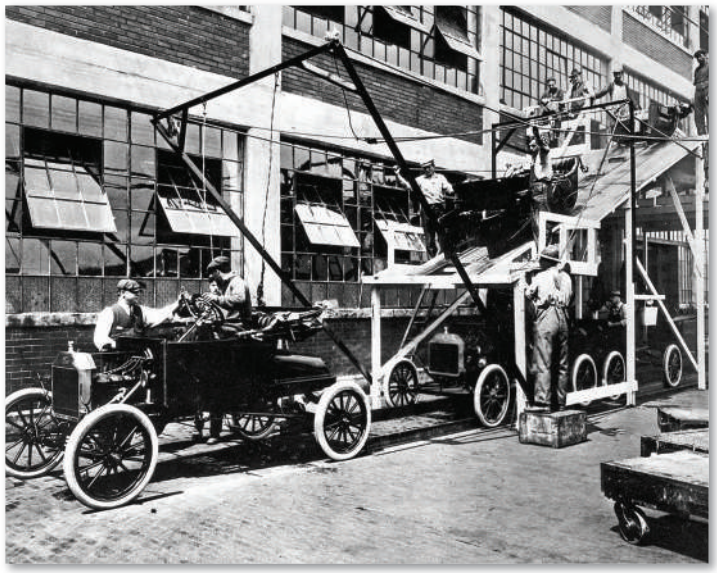
Land suitable for constructing a factory can be found in many places. If considered to encompass energy and other natural resources in addition to terra firma, "land" is an especially critical site factor. Energy inputs into production are discussed in Chapter 14.

Early factories located inside cities. To get the necessary space in cities, early factories were typically multistory. Raw materials were hoisted to the upper floors to make smaller parts, which were then sent downstairs on chutes and pulleys for final assembly and shipment (Figure 11-17).

Contemporary factories operate most efficiently when laid out in one-story buildings (Figure 11-18). Raw materials are typically delivered at one end of the factory and moved through the factory on conveyors or forklift trucks. Products are assembled in logical order and then shipped out at the other end of the factory. The land needed to build one-story factories is now more likely to be available in suburban and rural locations. Also, land is much cheaper in suburban and rural locations than near the center of a city.

▲ **FIGURE 11-16 APPLE HEADQUARTERS, SILICON VALLEY** Cupertino, California.

In addition to providing enough space for one-story buildings, locations outside cities are also attractive because they facilitate delivery of inputs and shipment of products. In the past, when most material moved in and out of a factory by rail, a central location was attractive because rail lines converged there. With trucks now responsible for transporting most inputs and products, proximity to major highways is more important for a factory. Especially attractive is proximity to the junction of a long-distance route and a beltway, or ring road, that encircles most cities. Thus, many factories cluster in industrial parks located near suburban highway junctions.



▲ **FIGURE 11-17 HISTORIC MULTISTORY FACTORY** In the early twentieth century, Ford assembled Model T cars in a multistory factory in Highland Park, Michigan. Bodies made on the second floor were slid down the ramp and attached to the chassis, which were made on the first floor and rolled outside.

▶ **FIGURE 11-18 MODERN FACTORY** Arla Foods, Aston Clinton, United Kingdom.

Site Factors: Clothing, a Labor-Intensive Industry

Learning Outcome 11.2.2 Explain the distribution of clothing production.

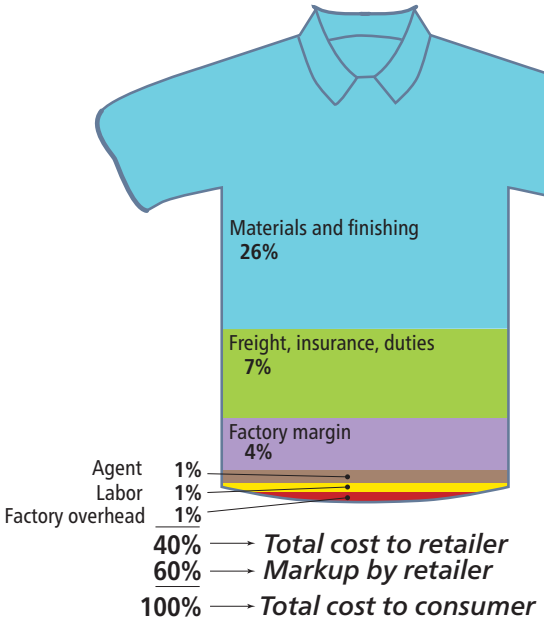
Production of **textiles** (woven fabrics) and **apparel** (clothing) is a prominent example of a labor-intensive industry that generally requires less-skilled, low-cost workers. The textile and apparel industry accounts for 6 percent of the dollar value of world manufacturing but a much higher 14 percent of world manufacturing employment, an indicator that it is a labor-intensive industry. The percentage of the world's women employed in this type of manufacturing is even higher.

Although apparel is a labor-intensive industry, most of the cost of clothing sold in developed countries is markup by the retailer. Workers in developing countries earn only around 1 percent of the final cost to the consumer (Figure 11-19). If the clothing were made in a developed country, the cost of labor would amount to more than 10 percent of the final cost to the consumer, and the price charged for the clothing would be higher.

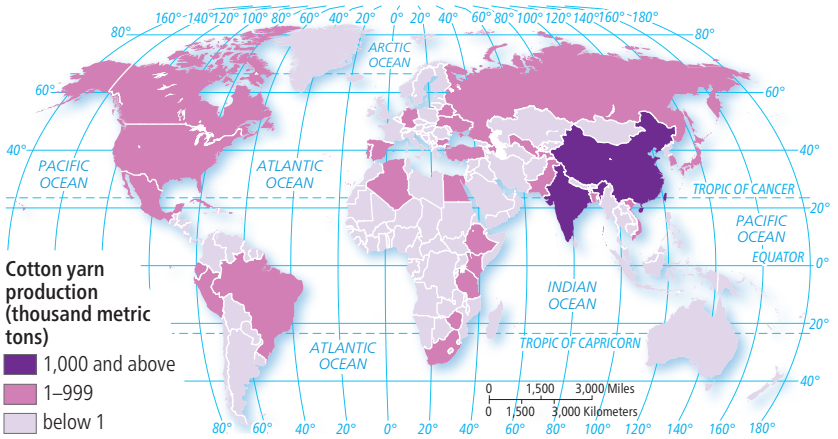
Clothing Production: Spinning

Between growing cotton (agriculture) and retailing (services) are several steps in the manufacturing of apparel such as a T-shirt. The three principal manufacturing steps are:

- Spinning of fibers to make yarn from natural or human-made materials.



▲ **FIGURE 11-19 SHIRT PRODUCTION COSTS**
Source: Macleans



▲ **FIGURE 11-20 DISTRIBUTION OF COTTON SPINNNING**
Source: United Nations

- Weaving or knitting of yarn into fabric, as well as finishing of fabric by bleaching or dyeing.
- Cutting and sewing of fabric for assembling into clothing and other products.

The three steps have different global distributions, because the importance of labor varies somewhat among them.

The first step in manufacturing apparel is spinning of fibers, which can be spun from natural or synthetic elements. The principal natural fiber is cotton. Synthetics now account for two-thirds of world thread production.

Before the Industrial Revolution, spinning of cotton was a job for a woman, often an unmarried daughter called a *spinster*, a term that came to be applied to any unmarried woman, not just those who were spinning cotton. Children often performed carding, which involved preparing the fibers for spinning by untangling them onto rolls called cards.

Because it is a labor-intensive industry, spinning is done primarily in low-wage countries (Figure 11-20). China produces more than 40 percent and India more than 20 percent of the world's cotton thread (Figure 11-21).

Synthetic fibers include regenerated synthetics and true synthetics. Regenerated synthetic fibers are produced from natural raw materials modified to produce fibers suitable for weaving. The first commercially successful regenerated synthetic was rayon, made by processing the cellulose in wood pulp. True synthetic fibers are produced from substances like petrochemicals that do not naturally form fibers. The first true synthetic fiber, nylon, was developed from petroleum in 1937. Polyester is now the leading true synthetic, accounting for 90 percent of synthetic fiber production.

▼ **FIGURE 11-21 COTTON SPINNNING FACTORY** Hebei, China.

Clothing Production: Weaving

The second step in production of apparel is weaving into cloth, and the third step is assembly into finished clothing. Once the clothing is assembled, it has to be transported to retailers.

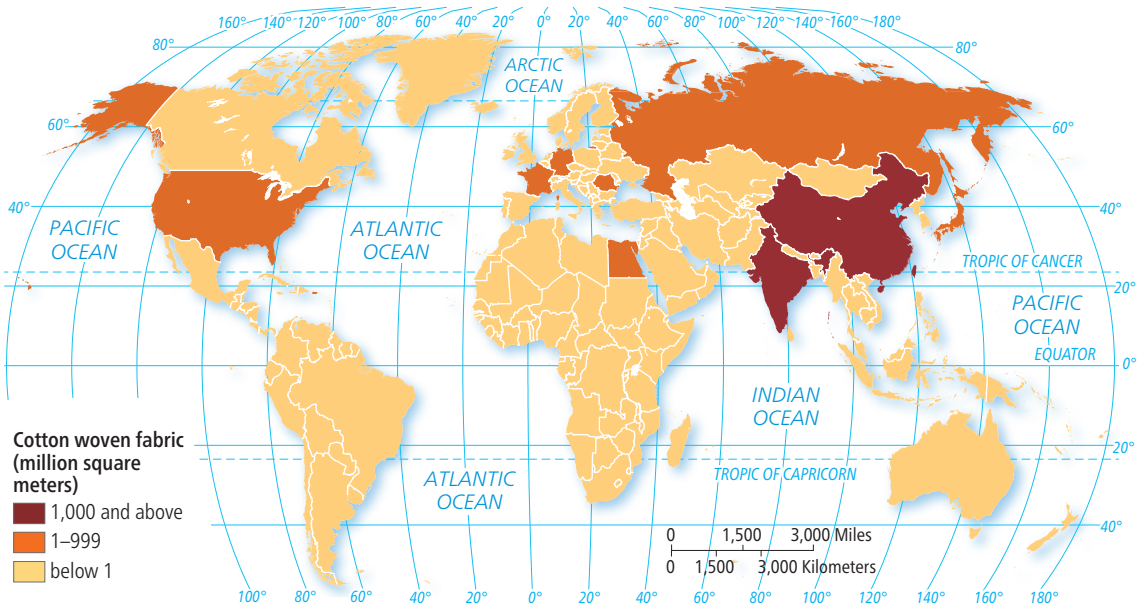
For thousands of years, fabric has been woven or laced together by hand on a loom, which is a frame on which two sets of threads are placed at right angles to each other. One set of threads, called the *warp*, is strung lengthwise. A second set of threads, called the *weft*, is carried in a shuttle that is inserted over and under the warp. As the process of weaving was physically hard work, weavers were traditionally men (Figure 11-22).

Edmund Cartwright, a church rector in Goadby, England, patented a power loom in 1785 and set up a weaving mill in Doncaster two years later. A better inventor than business leader, Cartwright went bankrupt in 1797, but the British House of Commons awarded him a then-generous sum of £10,000 in 1809 in recognition of his contribution to the textile industry.

Weaving is now mechanized (Figure 11-23), but labor still constitutes a high percentage of the total production cost. Consequently, weaving is highly clustered in low-wage countries (Figure 11-24). Despite their remoteness from European and North American markets, China and India have become the dominant fabric producers because their lower labor costs offset the expense of shipping inputs and products long distances. China accounts for around 60 percent of the world's woven-cotton fabric production and India around 30 percent.

▲ **FIGURE 11-22 COTTON WEAVING BY HAND** Kalna, India.

▲ **FIGURE 11-23 MECHANIZED COTTON WEAVING** Burhanpur, India. The loom machine was made in China.



▲ **FIGURE 11-24 DISTRIBUTION OF COTTON WEAVING**

Source: United Nations

Clothing Production & Trade

Learning Outcome 11.2.3 Explain the distribution of weaving, assembly, and trade of clothing.

Clothing Production: Assembly

The assembly of clothing is done by sewing (Figure 11-25). Sewing by hand is a very old human activity. Needles made from animal horns or bones date back tens of thousands of years, and iron needles date from the fourteenth century.

The first functional sewing machine was invented by French tailor Barthelemy Thimonnier in 1830. In 1841, Thimonnier installed 80 sewing machines in a factory in St.-Etienne, France, to sew uniforms for the French army. However, Parisian tailors, fearing the machines would put them out of work, stormed the factory and destroyed the machines. Isaac Singer manufactured the first commercially successful sewing machine in the United States during the 1850s.

Textiles are cut and sewn to be assembled into four main types of products: garments, carpets, home products such as bed linens and curtains, and industrial items such as headliners for motor vehicles. As with spinning and weaving, most clothing is manufactured in developing countries.

Developed countries play a larger role in assembly than in spinning and weaving because most of the consumers of assembled products are located in developed countries. For example, although most T-shirts sold in the United States are assembled elsewhere in the world, the messages and designs screened onto T-shirts sold in the United States are often done in the United States (Figure 11-26).

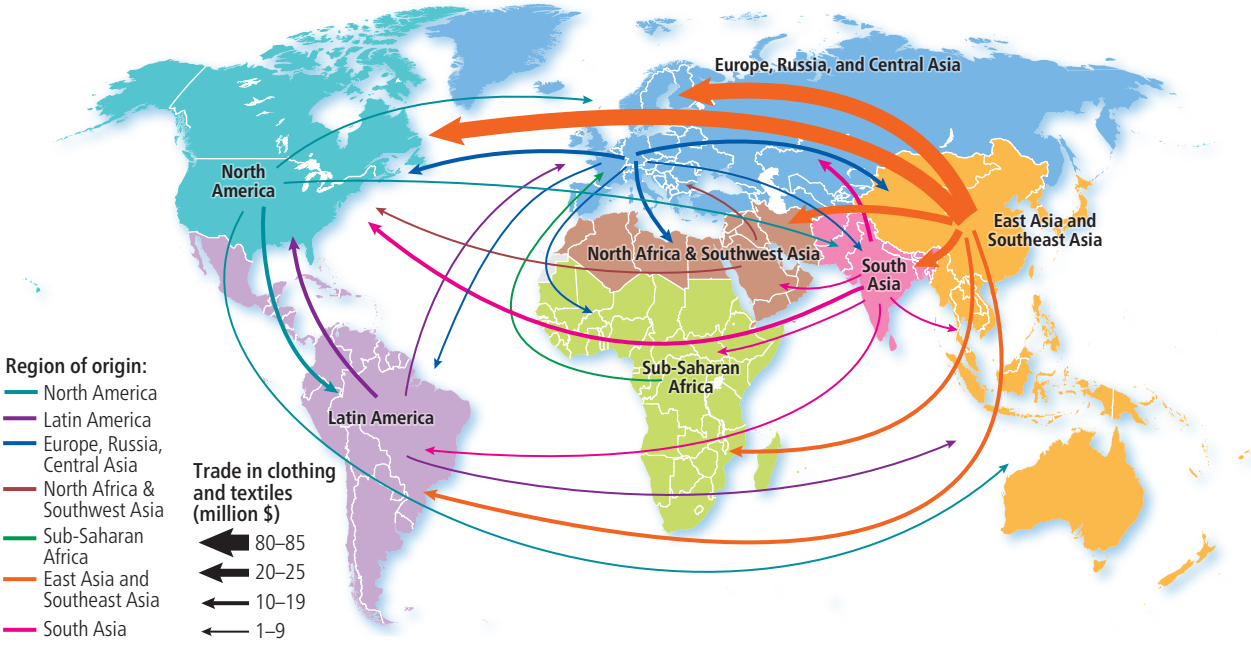
Pause & Reflect 11.2.3 Check the label on the shirt you are wearing at this moment. Where was it made?

▲ **FIGURE 11-25 T-SHIRT SEWING** San Jose, Costa Rica.

▲ **FIGURE 11-26 T-SHIRT SCREENING**

Clothing Trade

Overall production costs are generally lower in developing countries because substantially lower labor costs than in developed countries offset higher shipping and taxation costs. The largest flows of clothing are exported from East Asia and South Asia to developed countries in Europe and North America (Figure 11-27).



◀ **FIGURE 11-27 INTERNATIONAL TRADE IN CLOTHING** The largest flows of clothing are exported from East and Southeast Asia to North America and Europe.
Source: World Bank

Journey of a T-Shirt

The manufacturing of a T-shirt begins with raw materials, typically cotton (Figure 11-28). The production of cotton is an example of the primary sector of the economy (agriculture), discussed in Chapter 10. China, India, and the United States grow nearly two-thirds of the world's cotton (Figure 11-29).

Most of the cotton grown in the United States for T-shirt production is packed into 480-pound bales (Figure 11-30) and exported to Asia. One bale contains enough cotton to manufacture more than 700 T-shirts. China accounts for around 40 percent of the world's T-shirt production and South Asia for around 25 percent (Figure 11-31).

T-shirts manufactured in Asia are exported in container ships (Figure 11-32). Developing countries account for nearly all T-shirt production, but developed countries account for most T-shirt sales (Figure 11-33). The journey of a T-shirt ends at a retailer (Figure 11-34), an example of the tertiary sector of the economy.

FIGURE 11-28 COTTON GROWING IN THE UNITED STATES

FIGURE 11-29 SHARE OF COTTON PRODUCTION BY COUNTRY

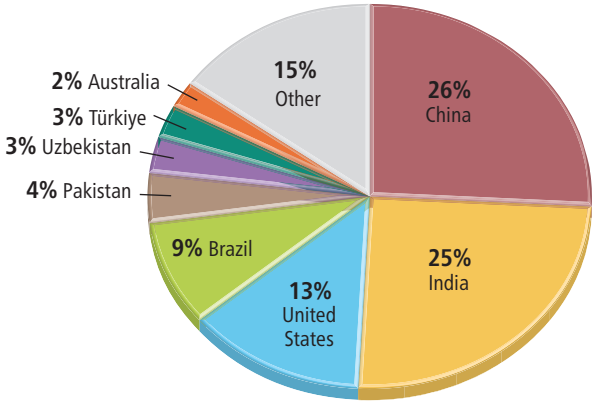


FIGURE 11-30 COTTON BALE Cotton grown in the United States is packed into bales and exported to Asia.

FIGURE 11-31 T-SHIRT PRODUCTION BY COUNTRY

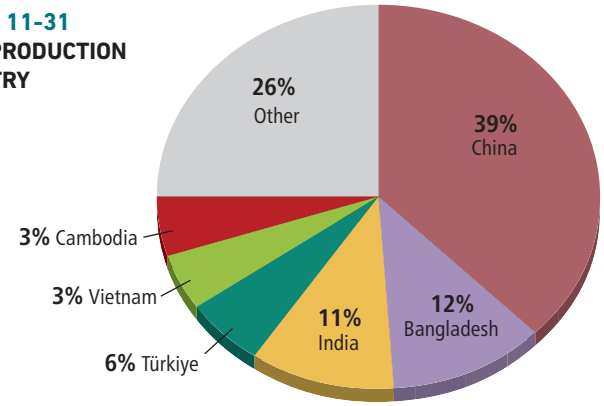


FIGURE 11-32 T-SHIRT EXPORTS Ships loaded with containers of T-shirts, Chittagong, Bangladesh.

FIGURE 11-33 T-SHIRTS SALES BY COUNTRY

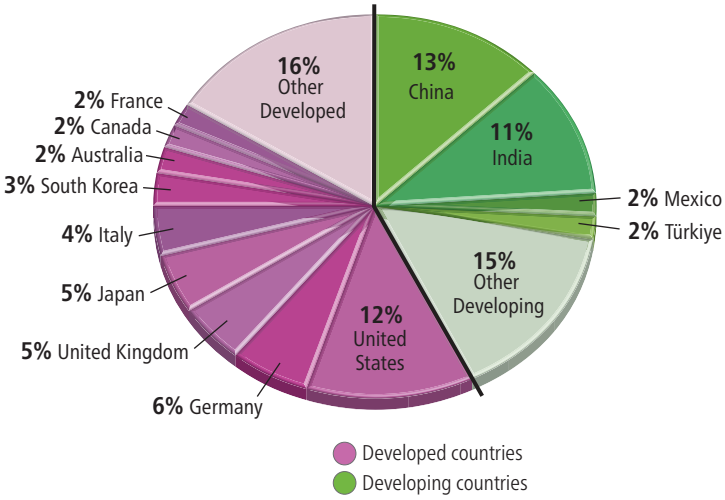


FIGURE 11-34 T-SHIRTS FOR SALE Bangladesh has become a world leader in manufacturing T-shirts.

KEY ISSUE

11.3 | Why Are Situation Factors Important for Industries?

Location factors relating to the transportation of materials into and from a factory are known as **situation factors**. A firm seeks a location that minimizes the cost of transporting inputs to the factory and finished goods to consumers. The farther something is transported, the higher the cost, so a manufacturer tries to locate its factory as close as possible to its inputs and markets.

▲ **FIGURE 11-36 COPPER MINE** Bingham Canyon Mine, Utah.

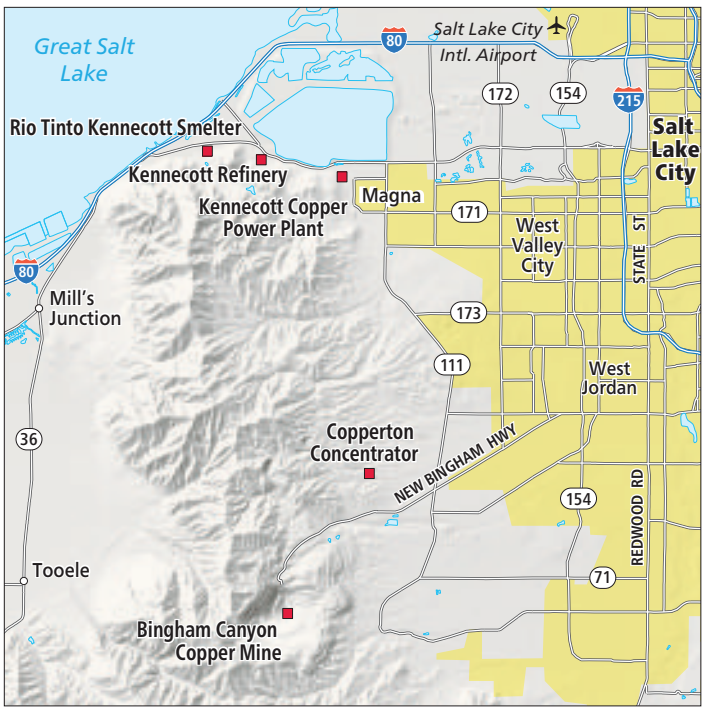
Situation Factors: Inputs

Learning Outcome 11.3.1 Explain why some industries locate near their inputs.

An industry in which the inputs weigh more than the final products is a **bulk-reducing industry**. To minimize transport costs, a bulk-reducing industry typically locates near its sources of inputs.

Bulk-Reducing Industry: Copper

Copper production involves five principal steps. The first four steps in the production of copper illustrate the importance of a bulk-reducing industry locating near its inputs. Figure 11-35 shows that the first four steps, which involve bulk-reducing manufacturing, are located very close to each other, near Salt Lake City, Utah. Arizona is also a center for the U.S. copper industry.



▲ **FIGURE 11-35 COPPER PRODUCTION NEAR SALT LAKE CITY, UTAH**

1. **Mining.** Mining in general is bulk reducing because the heavy, bulky ore extracted from mines is mostly waste, known as gangue. Figure 11-35 shows the location of Bingham Canyon Copper Mine (Figure 11-36).
2. **Concentration.** The ore is crushed and ground into fine particles, mixed with water and chemicals, filtered, and dried. Concentration mills are near copper mines because concentration transforms the heavy, bulky copper ore into a product of much higher value per weight. Figure 11-35 shows that Copperton Concentrator is located only 10 kilometers (6 miles) from Bingham Canyon Copper Mine.
3. **Smelting.** The concentrated copper becomes the input for smelters, which remove more impurities. Because smelting is a bulk-reducing industry, smelters are built near their main inputs – the concentration mills – again to minimize transportation costs. Rio Tinto Kennecott Smelter is located only 20 kilometers (12 miles) from Copperton Concentrator.
4. **Refining.** The purified copper produced by smelters is treated at refineries to produce copper cathodes, about 99.99 percent pure copper. Most refineries are located near smelters. Figure 11-35 shows that Kennecott Refinery is only 2 kilometers (1 mile) from the Rio Tinto smelter.
5. **Manufacturing.** Copper that is ready for use in other products is produced in foundries. This step is not bulk reducing, so foundries are located near markets on the East and West coasts rather than near inputs.

Pause & Reflect 11.3.1 What is an example of a product purchased by consumers that is made of copper?

Mineral Resources

Minerals are especially important inputs for many industries. Earth has 92 natural elements, but about 99 percent of the crust is composed of only 8 of them (Figure 11-37). The 8 most common elements combine with less abundant elements to form approximately 3,000 different minerals, all with their own properties of hardness, color, and density as well as spatial distribution.

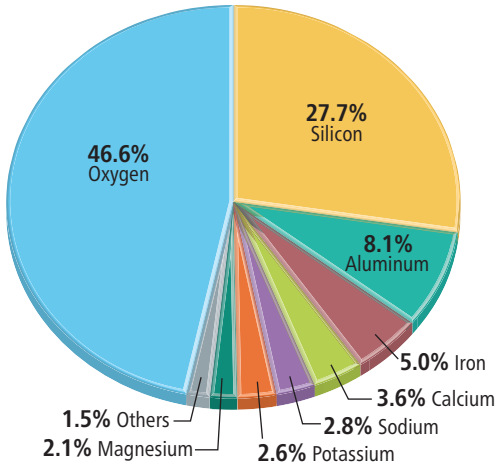
Many of these minerals have important industrial uses. For example, the top five minerals used in manufacturing an iPhone are bauxite (from which aluminum is derived), iron, lithium, gold, and copper. The key minerals used in manufacturing an electric vehicle battery are lithium, cobalt, nickel, graphite, and manganese.

Minerals are either nonmetallic or metallic:

- **Nonmetallic minerals.** By weight, more than 90 percent of the minerals that humans use are nonmetallic. Important nonmetallic minerals include building stones, gemstones such as diamonds, and minerals used in the manufacture of fertilizers such as nitrogen, phosphorus, potassium, calcium, and sulfur.
- **Metallic minerals.** Metallic minerals have properties that are especially valuable for fashioning machinery, vehicles, and other essential elements of contemporary society. They are to varying degrees malleable (able to be hammered into thin plates) and ductile (able to be drawn into fine wire) and are good conductors of heat and electricity.

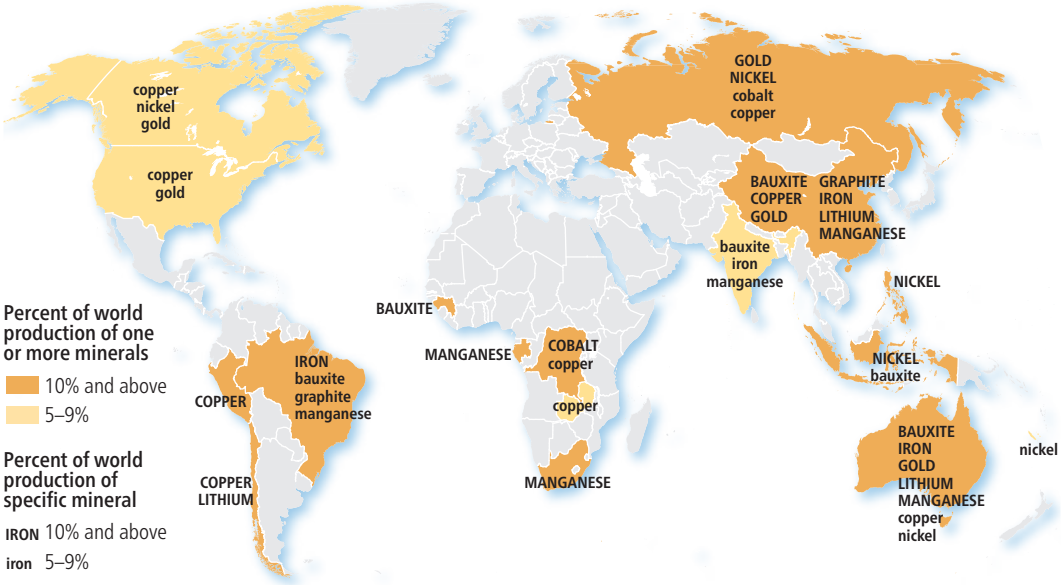
Many metals are capable of combining with other metals to form alloys with distinctive properties that are important for industry. Alloys are known as ferrous or nonferrous. A ferrous alloy contains iron, and a nonferrous one does not:

- **Ferrous alloys.** The word *ferrous* comes from the Latin for "iron." Iron is extracted from iron ore, by far the world's most widely used ore. Humans began fashioning tools and weapons from iron 4,000 years ago. Important metals used to make ferrous alloys include chromium, manganese, molybdenum, nickel, tin, titanium, and tungsten.
- **Nonferrous alloys.** Important metals utilized to manufacture products that don't contain iron and steel include aluminum (derived from bauxite), copper, lead, lithium, magnesium, zinc, precious metals (silver, gold, and the platinum group), and rare earth metals.



▲ **FIGURE 11-37 ELEMENTS IN EARTH'S CRUST**

Mineral resources are not distributed uniformly across Earth. Countries with important mineral resources for the production of iPhones and electric vehicle batteries are shown in Figure 11-38. Few important minerals are found in Europe, Central Asia, and Southwest Asia & North Africa. As shown in Figure 11-38, Russia is a leader in mining cobalt, copper, gold, and nickel. That country's 2022 invasion of Ukraine disrupted the availability of these inputs into battery production.



◀ **FIGURE 11-38 DISTRIBUTION OF MINERALS** Australia and China are especially well endowed with minerals that are important for industry.

Situation Factors: Proximity to Markets

Learning Outcome 11.3.2 Explain why some industries locate near markets.

For many firms, the optimal location is close to customers. Proximity to markets is a critical locational factor for three types of industries: single-market manufacturers, bulk-gaining industries, and perishable-products companies.

Single-Market Manufacturers

A single-market manufacturer is a specialized manufacturer with only one or two customers. The optimal location for these factories is often in close proximity to the customers. An example of a single-market manufacturer is a producer of buttons, zippers, clips, pins, or other specialized components attached to clothing. The clothing manufacturer may need additional supplies of these pieces on very short notice. The world's largest manufacturer of zippers, YKK, for example, has factories in 72 countries in order to be near its customers, the manufacturers of clothing (Figure 11-39).

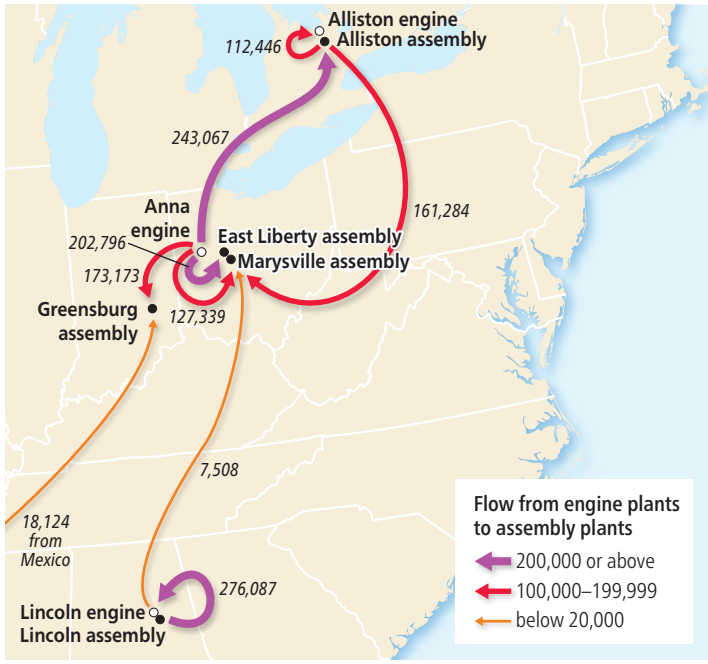
The engine that is installed in a motor vehicle is another example of a specialized product that has only one customer. A motor vehicle company, such as Ford or Honda, operates some factories that produce engines and some factories that assemble finished vehicles. The engine plants are typically located close to the final assembly plants. For example, Honda has an engine plant adjacent to a final assembly plant in Ontario, an engine plant adjacent to a final assembly plant in Alabama, and three assembly plants within a two-hour drive of an engine plant in Ohio (Figure 11-40).

Perishable-Products Companies

To deliver their products to consumers as rapidly as possible and avoid spoilage, perishable-products industries must be located near their markets. Because few people want stale bread or sour milk, food producers such as bakers and milk bottlers must locate near their customers to ensure rapid delivery. Processors of fresh food into frozen, canned, and preserved products can, however, be more distant from their customers. Cheese and butter, for example, are manufactured in Wisconsin because rapid delivery to the urban markets is not critical for products with a long shelf life and the area is well suited agriculturally for raising dairy cows.

The daily newspaper was once a good example of a perishable product because it contained dated information. When a printed newspaper was the principal source of news, people would demand their newspaper as soon after its printing as possible. Therefore, a newspaper would be printed in the same community as its readers. Delivering a newspaper before or after school was often the first job that a youth obtained (Figure 11-41). Inability to compete with digital sources of news that post online daily or even more frequently has led to a steep decline in printed newspapers in the United States, from 60 million subscribers in 2000 to 24 million subscribers in 2020.

▲ **FIGURE 11-39 SINGLE-MARKET MANUFACTURER** YKK zipper factory, Kurobe, Japan.



▲ **FIGURE 11-40 HONDA'S U.S. AND CANADA ASSEMBLY AND ENGINE PLANTS** Figures show 2020 production shares.

▼ **FIGURE 11-41 NEWSPAPER DELIVERY** Seventeen-year-old Ewan Butters delivers newspapers in Kinoulton, United Kingdom.

Bulk-Gaining Industries

A **bulk-gaining industry** makes something that gains volume or weight during production. To minimize transport costs, a bulk-gaining industry needs to locate near where the product is sold. Two examples of bulk-gaining manufactured products are fabricated metals and beverages.

Fabricated Metals. A fabricated-metal factory brings together metals such as steel and previously manufactured parts as the main inputs and transforms them into a more complex product.

Fabricators shape individual pieces of metal using such processes as bending, forging (hammering or rolling metal between two dies), stamping (pressing metal between two dies), and forming (pressing metal against one die). Separate parts are joined together through welding, bonding, and fastening with bolts and rivets.

Because fabricated and machined products typically occupy a larger volume than the sum of their individual parts and metals, the cost of shipping the final product to consumers is usually the most critical factor. Whereas steelmakers have traditionally located near raw materials, steel fabricators have traditionally located near markets. Machinery is fabricated for use in farms, factories, offices, and homes. Machine shops transform metal into useful products such as structural metal for buildings and bridges.

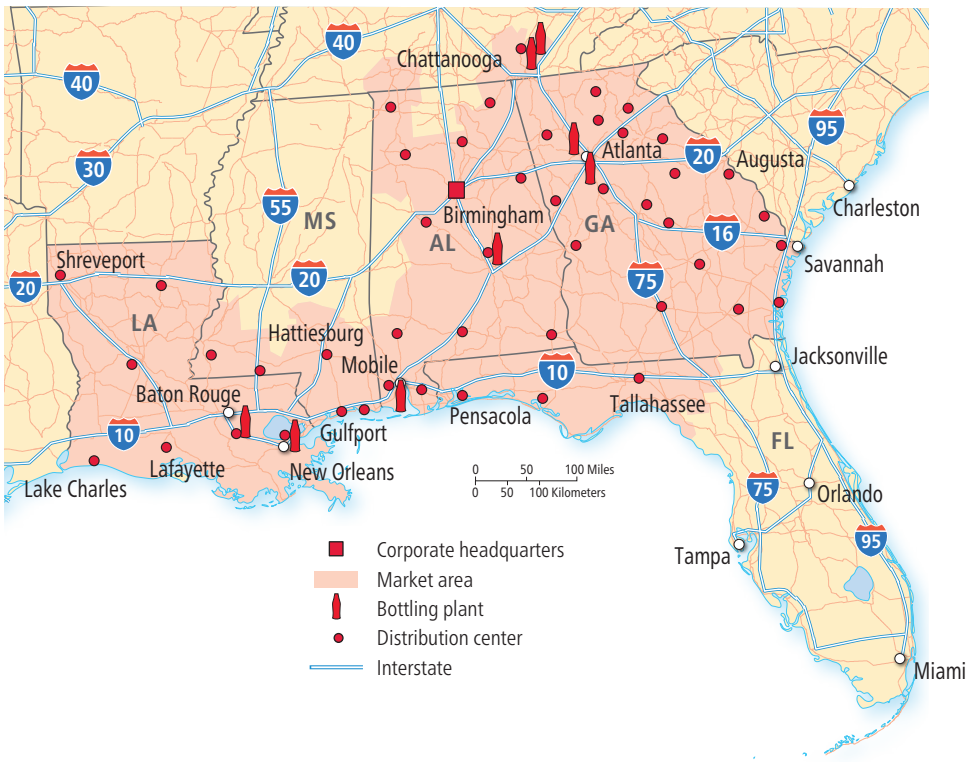
Beverage Production. Beverage bottling is another good example of a bulk-gaining industry. A soft-drink company like Coca-Cola manufactures (according to a proprietary recipe) a concentrated syrup, which it sells to bottlers. A bottler such as Coca-Cola Bottling Company UNITED mixes the syrup with water, fills cans and bottles with the beverage, and ships the filled containers to customers (Figure 11-42).

▲ **FIGURE 11-43 BEVERAGE BOTTLING** Coca-Cola Europacific Partners bottling factory, Cibitung, Indonesia.

The syrup that Coca-Cola produces is an example of a bulk-reducing industry. Consequently, Coca-Cola can manufacture the highly concentrated syrup in a few locations and ship it to numerous bottlers.

On the other hand, a soft-drink bottler is a good example of a bulk-gaining industry because the principal input is water, which is relatively bulky, heavy, and expensive to transport. If water were only available in a few locations around the world, then bottlers might cluster near the source of such a scarce, bulky input. But because water is available where people live, bottlers can minimize costs by producing beverages near their consumers instead of shipping water (their heaviest and bulkiest input) long distances. A filled bottle has the same volume as an empty one, but it is much heavier. Because they are heavier, the filled bottles are more expensive to ship than the empty ones, and bottlers locate near their customers rather than the manufacturers of the bottles or the syrup (Figure 11-43).

Pause & Reflect 11.3.2 How do transportation costs help determine the optimal location for each industry discussed in this section? Explain your answer.

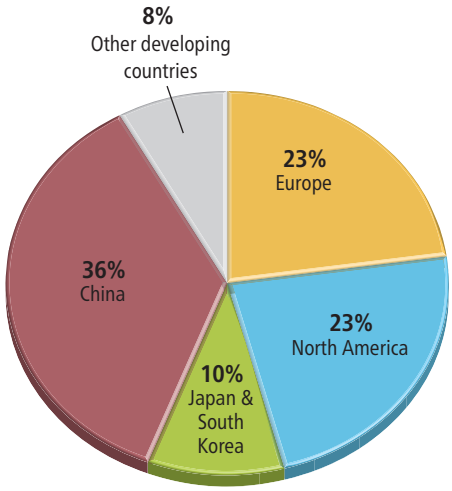


◀ **FIGURE 11-42 BULK-GAINING INDUSTRY** Coca-Cola Bottling Company UNITED operates numerous bottling plants near its customers, who are all located in the southeastern United States.

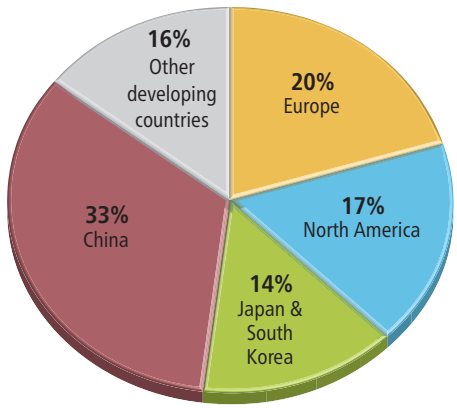
Proximity to Markets: The Auto Industry

Learning Outcome 11.3.3 Explain the location of motor vehicle factories.

The motor vehicle is a prominent example of a fabricated metal product that is likely to be built near its market. Around 90 million new motor vehicles are sold annually worldwide. The global distribution of the factories producing those motor vehicles closely resembles the global distribution of the customers for those vehicles.



▲ **FIGURE 11-44 SHARE OF MOTOR VEHICLE SALES** Europe, North America, and three countries in East Asia account for more than 90 percent of world vehicle sales.



▲ **FIGURE 11-45 SHARE OF MOTOR VEHICLE PRODUCTION** The distribution of production is closely related to the distribution of sales shown in Figure 11-44.

Global Distribution of Vehicle Sales & Production

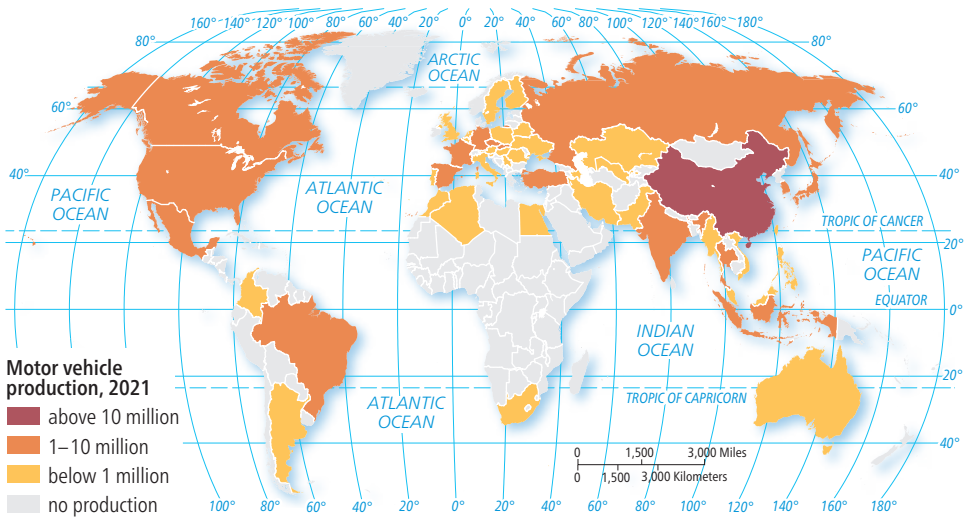
More than 90 percent of motor vehicles are sold in only three regions of the world: Europe, North America, and three countries in East Asia (Figure 11-44). The countries in East Asia are the developed countries of Japan and South Korea and the developing country of China. The rest of the world accounts for two-thirds of global population but less than 10 percent of global vehicle sales.

The global distribution of motor vehicle production closely matches the distribution of sales. Nearly 90 percent of sales are in the same three regions of the world: Europe, North America, and three countries in East Asia (Figure 11-45). China – the leading market for the sale of motor vehicles – is not by coincidence the leading country for the production of motor vehicles (Figure 11-46). The United States is the second largest market for motor vehicle sales and the second largest location for motor vehicle production.

This close match between production and sales of motor vehicles is typical of a bulk-gaining industry. A motor vehicle is a bulky and fragile object that is expensive to ship long distances, so carmakers seek locations for their factories that minimize transporting finished vehicles to their markets, which are dealerships that in turn sell the vehicles to individual customers.

Relatively few vehicles sold in North America are imported from Europe or East Asia. Similarly, most vehicles sold in Europe are assembled in Europe, most vehicles sold in Japan are assembled in Japan, and most vehicles sold in China are assembled in China. Even carmakers with headquarters elsewhere in the world assemble most vehicles in the regions where they are sold. For example, 85 percent of the vehicles that Honda sold in North America in 2021 were assembled in North America, and only 15 percent were imported from Japan, where the company has its headquarters.

While most vehicles are produced near where they are sold, the nationality of the manufacturers is less likely to be local. Eight carmakers sold at least 4 million vehicles in 2020 and together accounted for two-thirds of the world's sales. These included two based in North America (Ford and GM), three based in Europe (Germany's Volkswagen; France's Renault, which controls Nissan and Mitsubishi; and the Netherlands' Stellantis, which controls Chrysler, Peugeot, and Fiat), and three based in East Asia (Japan's Toyota and Honda, and South Korea's Hyundai). These carmakers operate assembly plants in all three major industrial regions.



▲ **FIGURE 11-46 MOTOR VEHICLE PRODUCTION BY COUNTRY** China and the United States are the two leading producers of motor vehicles.

Regional Distribution of Auto Production

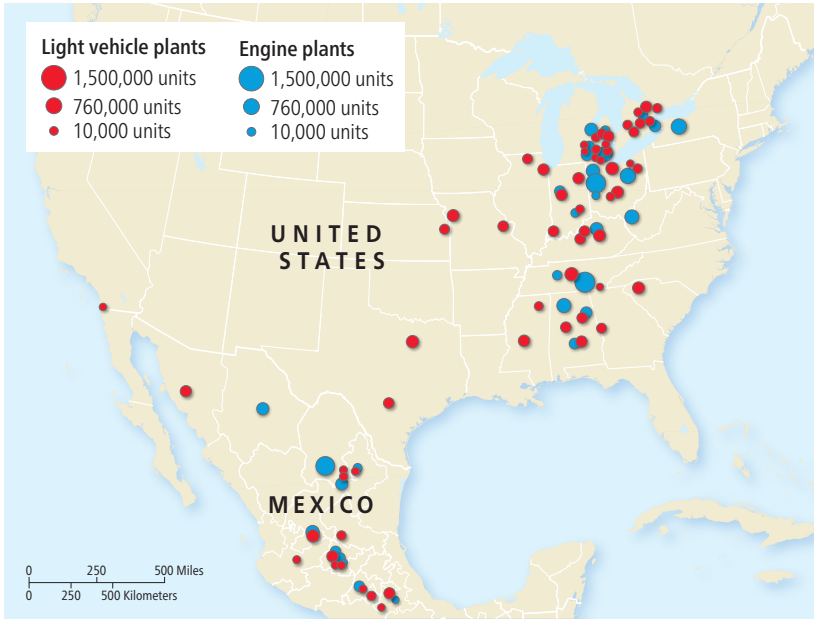
The production of motor vehicles involves two types of factories: parts manufacturing and final assembly. Several thousand factories make the individual parts that go into motor vehicles, such as seats and transmissions. These parts are attached to make finished vehicles at final assembly plants. The final assembly plants are owned by carmakers, such as Ford and Toyota. Carmakers owns some of the parts plants, such as engine and transmission, but most are owned by independent suppliers. The assembly plants owned by carmakers account for only around 30 percent of the value of the vehicles that bear their names. Independent parts makers supply the other 70 percent of the value.

Within North America and within Europe, the two types of motor vehicle plants are highly clustered rather than dispersed throughout the regions. Within both regions, the distribution is based on the importance of situation factors, specifically proximity to customers.

Auto Production in North America. Most vehicles sold in North America are manufactured in a north-south corridor known as auto alley that stretches 1,600 kilometers (1,000 miles) between southwestern Ontario and the Gulf of Mexico (Figure 11-47). Carmakers have located most of their final assembly plants in auto alley in order to minimize the cost of shipping fully assembled bulk-gaining vehicles to consumers throughout North America either by truck or by train. Most parts makers in turn locate in auto alley in order to facilitate just-in-time delivery to their customers, which are the final assembly plants. For example, Honda assembles vehicles at five final assembly plants in auto alley, including two in Ohio and one each in Alabama, Indiana, and Ontario. Most of the engines used at these final assembly plants came from Honda's nearby engine factories (refer to Figure 11-40).

In the past, most motor vehicle parts were made in Michigan and shipped to nearby warehouses and distribution centers maintained in that state by the major producers. From the warehouses, the producers sent the parts to plants around the country where the vehicles were assembled. Parts makers now ship most of their products directly to assembly plants and are therefore more likely than in the past to cluster near the final assembly plants.

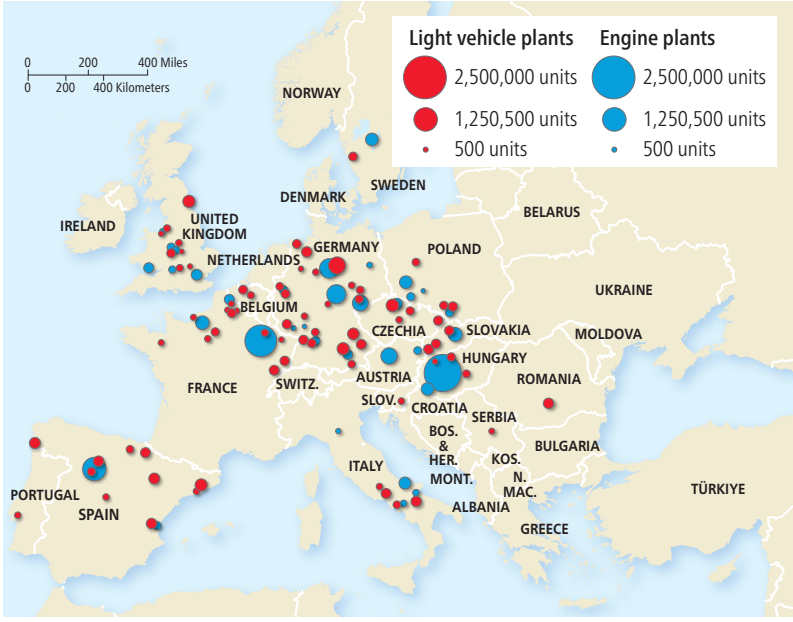
Auto Production in Europe. The distribution of production within Europe closely resembles the pattern seen in North America. Most European vehicles are assembled in a corridor between France and Slovakia, passing through Germany, Poland, and Czechia (Figure 11-48). Similarly, most parts are produced in that region.



▲ **FIGURE 11-47 DISTRIBUTION OF NORTH AMERICAN AUTO PLANTS**

Europe's motor vehicle industry was once fragmented among each country. German-owned companies produced vehicles in Germany for sale in Germany, and French-owned companies produced vehicles in France for sale in France. Barriers to the distribution of production and sale among European countries have been largely dismantled, especially among the 27 members of the European Union. As a result, carmakers can locate production facilities in accordance with situation factors for sale of vehicles across Europe.

Pause & Reflect 11.3.3 Although China and the United States are the two leaders in motor vehicle production, vehicles made in China are rarely sold in the United States, and similarly U.S.-made vehicles are rarely sold in China. What geographic factors might account for these low figures?



▲ **FIGURE 11-48 DISTRIBUTION OF EUROPEAN AUTO PLANTS**

KEY ISSUE

11.4 | Why Has the Distribution of Industries Changed?

Industry is on the move around the world. Site factors, especially labor costs, have stimulated industrial growth in new regions, both internationally and in developed regions. Situation factors, especially proximity to growing markets, have also played a role in the emergence of new industrial regions.

Emerging Industrial Regions

Learning Outcome 11.4.1 Explain reasons for the emergence of new manufacturing centers.

In 1990, three-fourths of the world's manufacturing was clustered in the developed regions of Europe and North America. Today, these two regions account for only one-third of the world's industrial output. Industry's share of total economic output has steadily declined in developed countries since the 1970s. The share of world industry in other regions has increased from one-sixth in 1970 to one-half in 2010. China alone accounts for roughly the same industrial output as Europe and North America combined.

New International Division of Labor

Transnational corporations have been especially aggressive in using low-cost labor in developing countries. To remain competitive in the global economy, they carefully review their production processes to identify steps that can be performed by low-paid, low-skilled workers in developing countries.

Despite the greater transportation cost, transnational corporations can profitably transfer some work to developing countries, given their substantially lower wages compared to those in developed countries. At the same time, operations that require highly skilled workers remain in factories in developed countries. This selective transfer of some jobs to developing countries is known as the **new international division of labor**.

Journey of an iPhone

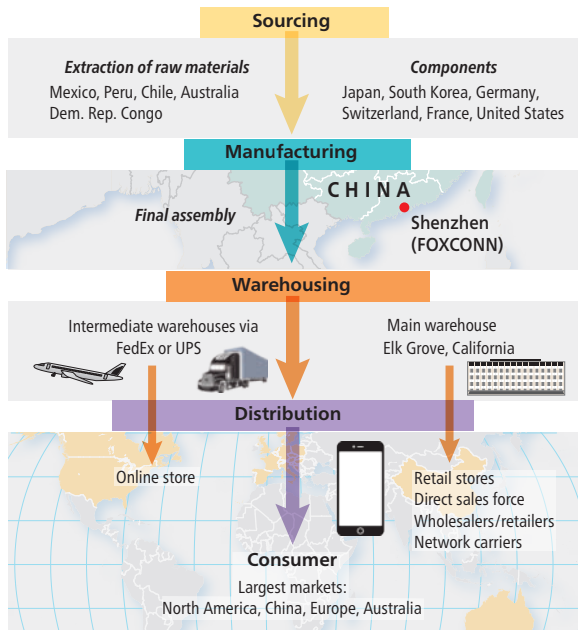
The manufacturing of an iPhone illustrates the selective transfer of some jobs to developing countries that characterizes the new international division of labor. Production of an iPhone starts with the extraction of minerals from mines, including bauxite (aluminum), cobalt, copper, gold, iron, lithium, and titanium (refer to Figure 11-38); mineral extraction is an economic activity classified as part of the primary sector, along with agriculture. The journey of an iPhone ends with a purchase by an individual customer, either in a store or online, a service activity classified as part of the tertiary sector (see Chapter 12). Between these two steps is the manufacturing of the device in factories (Figure 11-49).

Apple outsources 98 percent of the manufacturing of an iPhone to other companies. **Outsourcing** is the transfer of the responsibility for production to independent suppliers. Outsourcing has had a major impact on the distribution of manufacturing because each step in the production process is now scrutinized closely in order to determine the optimal location for production. Outsourcing is especially important in the electronics industry. Outsourcing contrasts with the approach typical of traditional mass production, called **vertical integration**, in which a company controls all phases of a highly complex production process.

Apple's largest iPhone supplier is Foxconn, the world's largest electronics contractor. Foxconn assembles iPhones in China with parts obtained from over 200 suppliers. Among the largest suppliers are Toshiba in Japan, Samsung in South Korea, and Infineon in Germany.

Foxconn employs around 1 million people in China, including several hundred thousand at its Foxconn City complex in Shenzhen. Working conditions at Foxconn have been scrutinized by Chinese and international organizations. A large percentage of Foxconn's employees live in dormitories near the factories, and they work long hours for low wages and limited benefits. More controversial is an internship program employing young people during the summers that critics charge is a way for the company to get free child labor.

The assembled iPhones are driven by truck from the Foxconn factory complex to a nearby airport or port, where they are transported to warehouses and distribution centers around the world, including one in Elk Grove, California. From there, the devices are sent to retailers, an example of a service rather than an industry.



▲ **FIGURE 11-49 JOURNEY OF AN IPHONE**

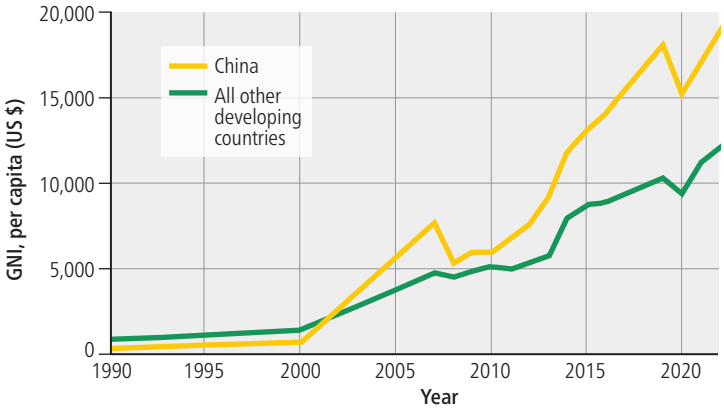
China's Industrial Assets

China's industrial leadership rests on a combination of situation and site factors. China has important assets in both types of factors.

China's Situation Factors. Both types of situation factors – proximity to inputs and proximity to markets – have played important roles in China's emergence as the world's leading industrial nation.

- **Locating near customers.** Because it has been the world's most populous country (for thousands of years), China is attractive to industries that wish to locate near a large number of customers. The income per capita in China has risen from around $1,000 in 2000 to $19,000 in 2022. In comparison, developing countries other than China have had more modest increases in income per capita, from $1,500 in 2000 to $12,000 in 2022 (Figure 11-50).
- **Locating near inputs.** China is an attractive location for industries that need to be near raw materials. It is a leading producer of many minerals and metals essential for manufacturing, especially those needed for production of electronics, including more than three-fourths of the world's graphite and at least 10 percent of the world's bauxite, copper, gold, iron, lithium, and manganese.

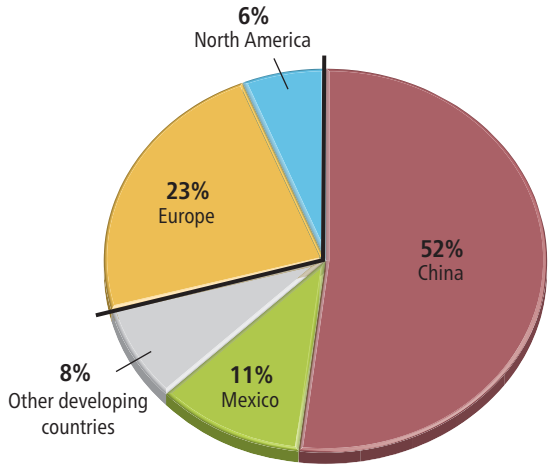
▼ **FIGURE 11-50 INCOME PER CAPITA, CHINA AND OTHER DEVELOPING COUNTRIES**



▼ **FIGURE 11-51 FITNESS EQUIPMENT FACTORY** Jiangsu, China.

China's Site Factors. China's industrial leadership derives not only from the two situation factors of proximity to important inputs and proximity to a large market, but also from all three site factors: land, labor, and capital.

- **Land.** At a national scale, most of China's factories are clustered in the eastern half of the country (refer to Figure 11-8). Chinese companies that export most of their products are more likely to select locations near a major port (Figure 11-51).
- **Labor.** In China, labor is abundant, given the country's large population. Manufacturing wages average around $6 per hour in China, compared with over $20 in developed countries. According to Apple Inc. executives, the iPhone is assembled in China, rather than in the United States, because Chinese workers are allegedly more skilled than American workers at manufacturing electronics (Figure 11-52).
- **Capital.** Much of the capital invested to develop new and expanding industrial sectors such as electronics comes from the government of China. Capital also comes from foreign companies that are required to invest in Chinese companies in order to produce and sell in China. Availability of capital has been a key factor in China becoming the dominant producer of electric vehicles (Figure 11-53).



▲ **FIGURE 11-52 COMPUTER EXPORTS** China exports more than half of the world's computers.

▼ **FIGURE 11-53 GENERAL MOTORS FACTORY, QINGDAO, CHINA** The factory is a joint venture with SAIC Motor, which is owned by the government of China.

Changing Situation Factors: Steel

Learning Outcome 11.4.2 Summarize changes in the distribution of steel production.

Steel is an alloy of iron that is manufactured by removing impurities in iron, such as silicon, phosphorus, sulfur, and oxygen, and adding desirable elements, such as manganese and chromium. In the past, steel production was a good example of a bulk-reducing industry that located near its inputs.

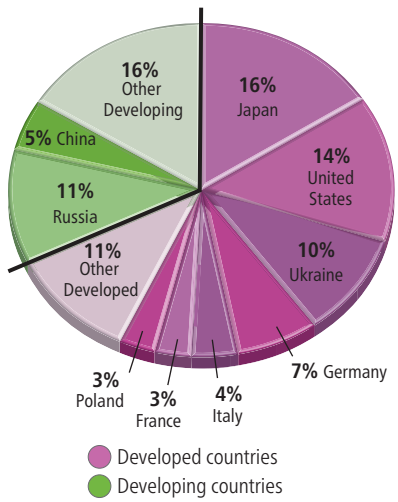
Situation factors are still important, but two changes in these factors have altered the distribution of steel producers within the United States and worldwide:

- Changes in the relative importance of the main inputs.
- Increasing importance of proximity to markets.

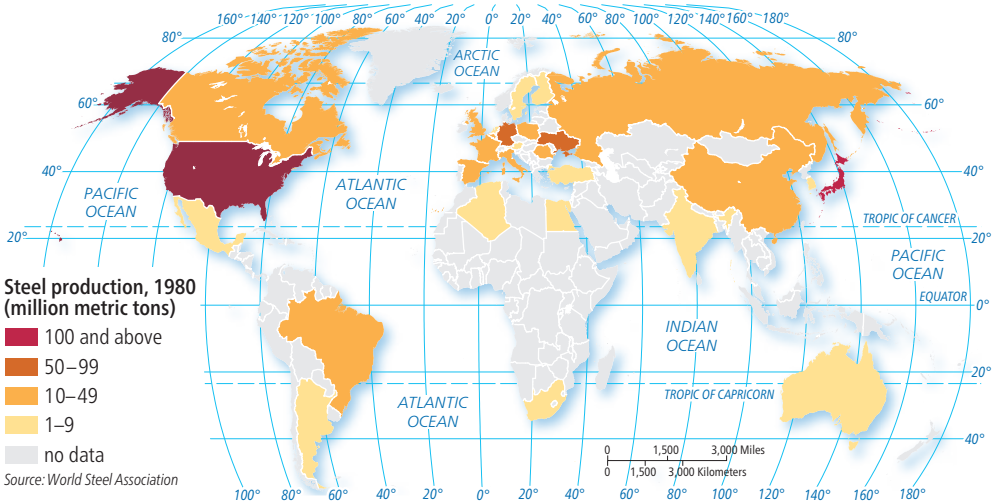
Distribution of Steel Production

The shift of world manufacturing to new industrial regions can be seen clearly in steel production. In 1980, 68 percent of world steel was produced in developed countries and 32 percent in developing countries (Figure 11-54). Japan and the United States were the leading producers of steel in 1980 (Figure 11-55).

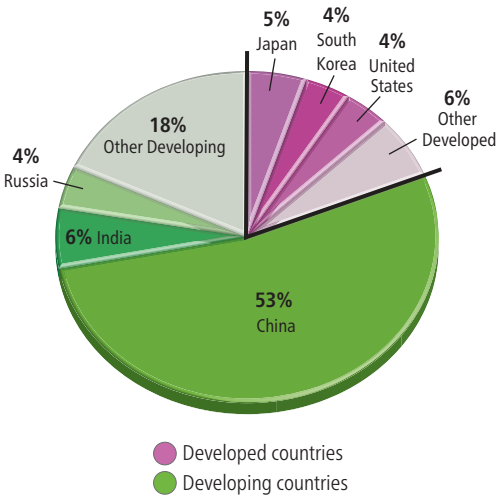
The share of world steel production in developed countries declined from 68 percent in 1980 to 19 percent in 2021 (Figure 11-56). Between 1980 and 2021, world steel production nearly tripled, from 0.7 billion metric tons in 1980 to 2.0 billion metric tons in 2021. China was responsible for 1.0 billion of the 1.3 billion metric ton increase in worldwide steel production between 1980 and 2021 and accounted for more than half of worldwide steel production in 2021 (Figure 11-57). Steel production increased between 1980 and 2021 in other developing countries, especially in India. Production has increased in China primarily because industries that use a lot of steel, such as motor vehicle production, have grown rapidly in that country.



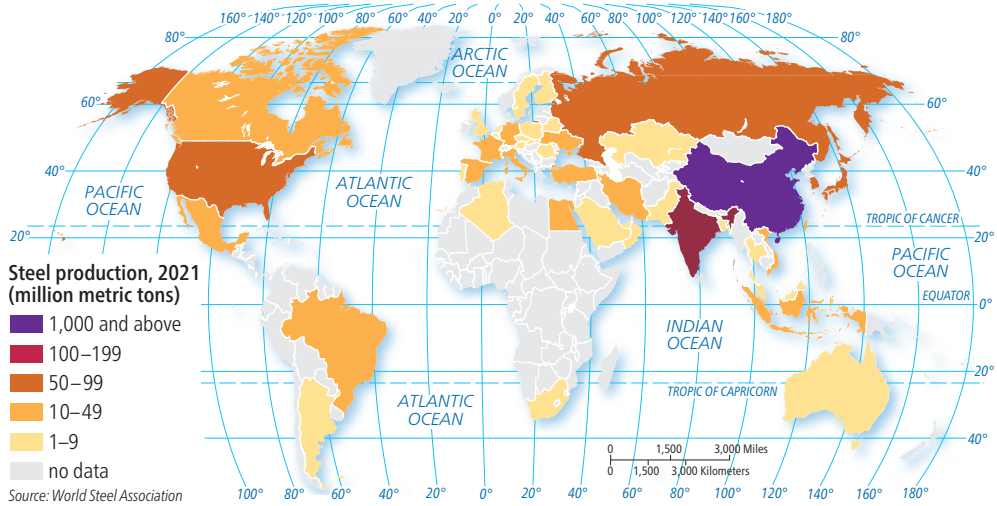
▲ **FIGURE 11-54 SHARE OF STEEL PRODUCTION, 1980**
Source: World Steel Association



▲ **FIGURE 11-55 STEEL PRODUCTION BY COUNTRY, 1980**
Source: World Steel Association



▲ **FIGURE 11-56 SHARE OF STEEL PRODUCTION, 2021**
Source: World Steel Association



▲ **FIGURE 11-57 STEEL PRODUCTION BY COUNTRY, 2021**
Source: World Steel Association

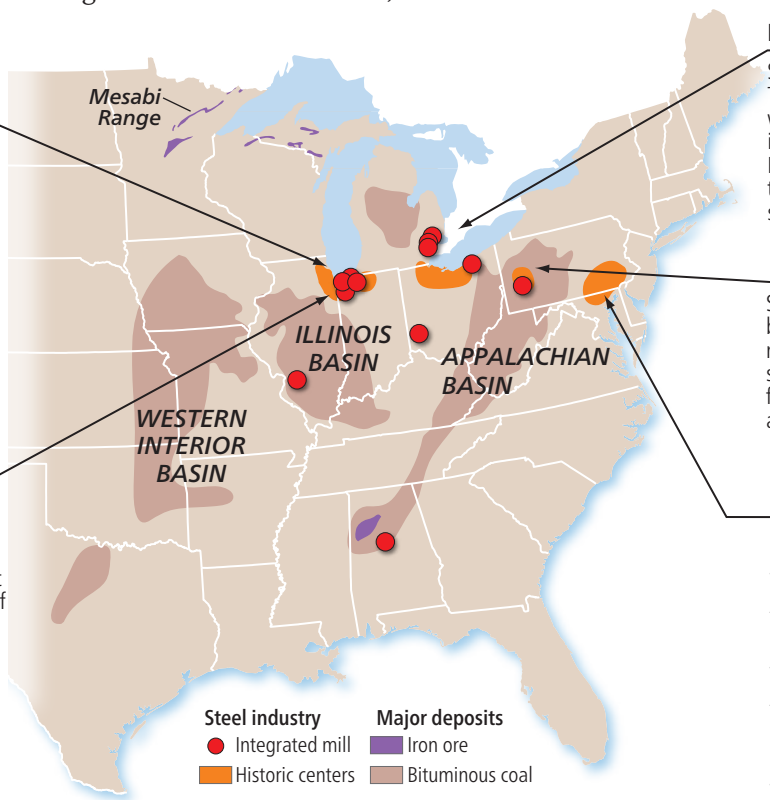
Changing Distribution of U.S. Steel Production

The two principal inputs in steel production are iron ore and coal. Most steel was produced at large integrated mill complexes. They processed iron ore, converted coal into coke, converted the iron into steel, and formed the steel into sheets, beams, rods, or other shapes.

Because of the need for large quantities of bulky, heavy iron ore and coal, steelmaking traditionally clustered near sources of the two key raw materials. Within the United States, the distribution of steel production changed several times during the nineteenth and twentieth centuries because of changing inputs. More recently, steel production has relocated to be closer to markets (Figure 11-58).

The increasing importance of proximity to markets is also demonstrated by the recent growth of steel minimills, which have captured one-fourth of the U.S. steel market. Rather than iron ore and coal, the main input into minimill production is scrap metal. In the past, most steel was produced at large integrated mill complexes. They processed iron ore, converted coal into coke, converted the iron into steel, and formed the steel into sheets, beams, rods, or other shapes. Minimills, generally limited to one step in the process – steel production, are less expensive than integrated mills to build and operate, and they can locate near their markets because their main input – scrap metal – is widely available (Figure 11-59).

Pause & Reflect 11.4.2 Why do you think proximity to markets has become increasingly important in the steel industry? What characteristics of minimills have facilitated this trend?



EARLY 1900s

Most new steel mills were located near the southern end of Lake Michigan. The main raw materials continued to be iron ore and coal, but changes in steelmaking required more iron ore in proportion to coal. Thus, new steel mills were built closer to the Mesabi Range to minimize transportation cost. Coal was available from nearby southern Illinois, as well as from Appalachia.

LATE 1900s

Most U.S. steel mills closed. The survivors are mostly around the southern Great Lakes. Proximity to markets has become more important than the traditional situation factor of proximity to inputs. Coastal plants provide steel to large East Coast population centers, and southern Great Lakes plants are centrally located to distribute their products countrywide.

LATE 1800s

Steel mills were built around Lake Erie. The shift westward from Pennsylvania was influenced by the discovery of rich iron ore in the Mesabi Range in northern Minnesota. The ore was transported through the Great Lakes. Coal was shipped from Appalachia by train.

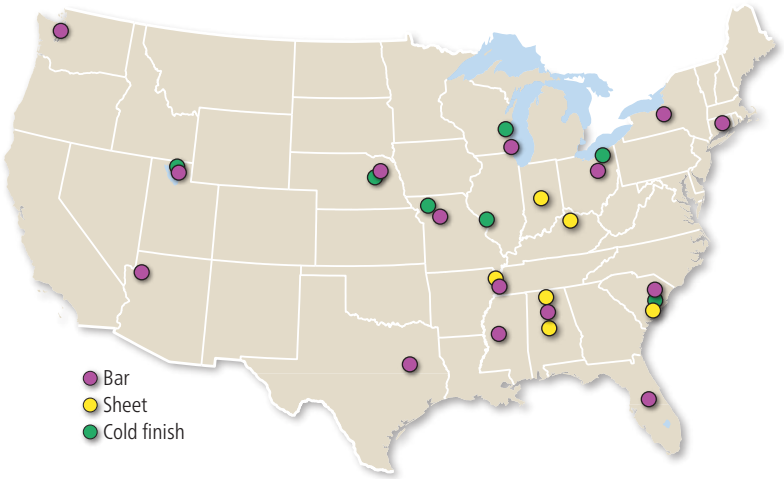
MID–1800s

Steel concentrated around Pittsburgh because iron ore and coal were both mined there. The area no longer has steel mills, but it remains the center for steel industry research and administration.

MID–1900s

Most new U.S. steel mills during the period were located near the East and West coasts, including Baltimore, Los Angeles, and Trenton, New Jersey. Iron ore increasingly came from other countries, especially Canada and Venezuela, and locations near the Atlantic and Pacific oceans were more accessible to those foreign sources. Scrap iron and steel—widely available in the large metropolitan areas of the East and West coasts—became an important input in the steel-production process.

▲ **FIGURE 11-58 INTEGRATED STEEL MILLS IN THE UNITED STATES** Integrated steel mills are clustered near the southern Great Lakes, especially Lake Erie and Lake Michigan. Historically, the most critical factor in situating a steel mill was to minimize transportation cost for raw materials, especially heavy, bulky iron ore and coal. In recent years, many integrated steel mills have closed. Most surviving mills are in the southern Great Lakes to maximize access to consumers.



▶ **FIGURE 11-59 MINIMILLS** Minimills, which produce steel from scrap metal, are more numerous than integrated steel mills, and they are distributed around the country near local markets. Shown are the bar, sheet, and cold finish minimills owned by Nucor Corporation, the largest minimill operator in the United States.

Changing Distribution of North America's Industries

Learning Outcome 11.4.3 Summarize changes in the distribution of manufacturing within North America.

The location of factories has changed within the United States and among the countries of North America. Underlying the changing distribution is a combination of cooperation among countries in North America and competition among communities and regions within the United States.

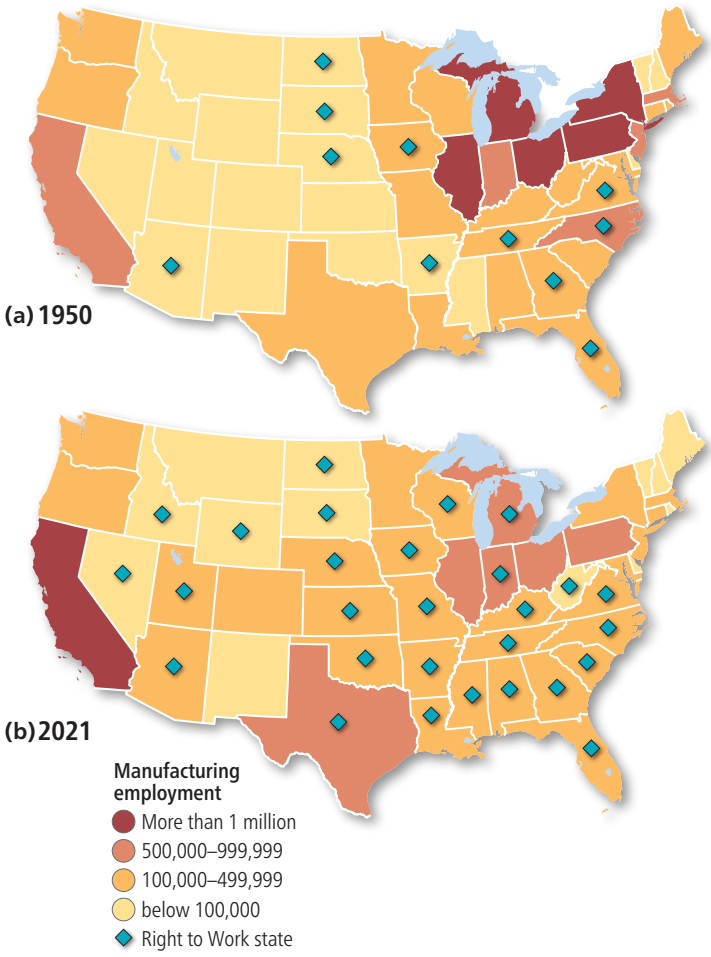
Intraregional Shifts in the United States

Within the United States, industry has shifted from the Northeast toward the South and West (Figure 11-60). Factories have closed in the Northeast (Figure 11-61), and new ones have been constructed in the South and West (Figure 11-62). Government subsidies have influenced location decisions, including tax breaks, worker training, and infrastructure construction.

A major lure for many companies to locate factories in the South and West has been right-to-work laws. A **right-to-work law** requires a factory to maintain an "open shop" and prohibits a "closed shop." In a closed shop, a company and a union agree that everyone must join the union to work in the factory. In an open shop, a union and a company may not negotiate a contract that requires workers to join a union as a condition of employment. Right-to-work laws make it much more difficult for unions to organize factory workers, collect dues, and bargain with employers from a position of strength.

Pause & Reflect 11.4.3 Which site factor do right-to-work laws influence, and how have they affected U.S. industrial location? Explain your answer.

▲ **FIGURE 11-61 CLOSED NORTHERN FACTORY** A forest of trees grows on the roof of the former Packard assembly plant in Detroit. The plant, which opened in 1903, once employed 40,000 people. The factory has been closed since 1958.



▲ **FIGURE 11-60 CHANGING DISTRIBUTION OF U.S. INDUSTRY** (a) In 1950, manufacturing was highly clustered in the Southern Great Lakes. (b) In the twenty-first century, industry has declined in the Northeast and increased in the South and West.
Source: National Association of Manufacturers

▲ **FIGURE 11-62 NEW SOUTHERN FACTORY** Kia Motors assembly plant, West Point, Georgia, opened in 2010.

Mexico & Trade with Neighbors

Manufacturing has been increasing in Mexico. Under the United States–Mexico–Canada Agreement (USMCA), which was implemented in 2020, and its predecessor, the North American Free Trade Agreement (NAFTA), manufacturers can move inputs and finished products from one country to another without having to pay a tariff or meet other requirements, as long as most of the inputs in the products are made somewhere in North America. Free trade agreements have helped to promote integration of manufacturing operations among Canada, Mexico, and the United States. For example, around half of the motor vehicles manufactured in North America are assembled in one of the three countries with an engine produced in one of the other two countries (Figure 11-63).

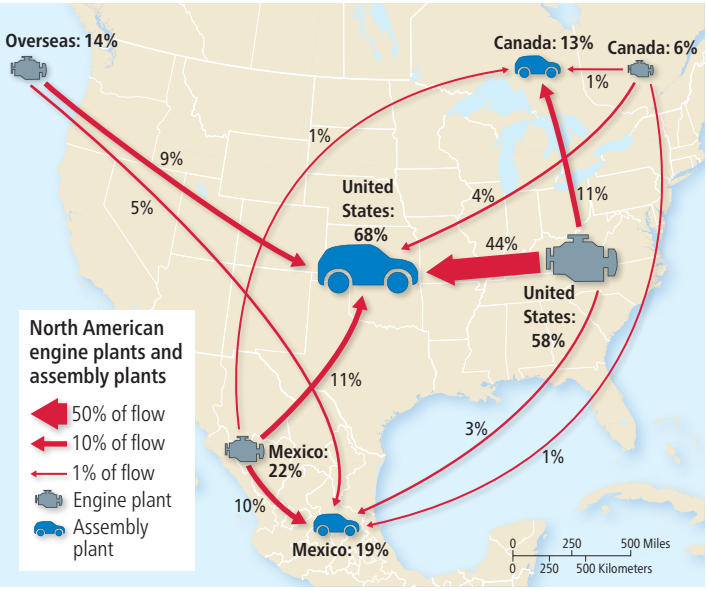
Because it is the nearest low-wage country to the United States, Mexico attracts industries concerned with both a site factor (low-cost labor) and a situation factor (proximity to U.S. markets). Nearly all the growth of motor vehicle production in North America, for example, has been located in Mexico rather than the United States or Canada (Figures 11-64 and 11-65). Parts plants in Mexico are able to ship parts in freight trains to final assembly plants in the United States (Figure 11-66).

Plants in Mexico near the U.S. border are known as **maquiladoras**. The term originally applied to a tax when Mexico was a Spanish colony. Under U.S. and Mexican laws, companies receive tax breaks if they ship materials from the United States, assemble components at a maquiladora plant in Mexico, and export the finished product back to the United States. More than 1 million Mexicans are employed at more than 3,000 maquiladoras.

Integration of North American industry has generated fear in the United States and Canada. Labor leaders fear that more manufacturers will relocate production to Mexico to take advantage of lower wage rates. Labor-intensive industries such as food processing, electronics, and textile manufacturing are especially attracted to regions where prevailing wage rates are lower.

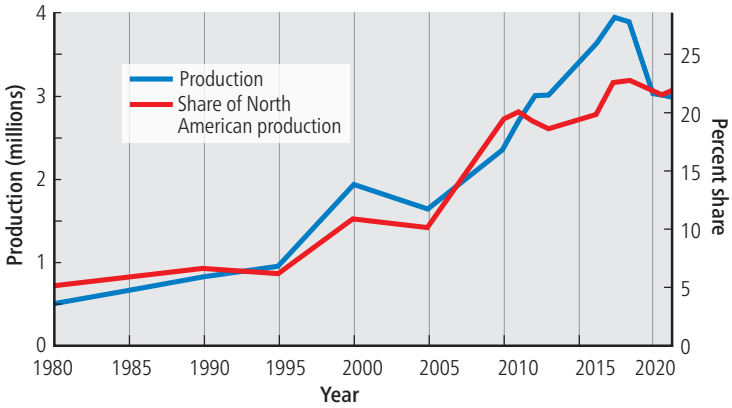
Environmentalists argue that trade agreements have encouraged firms to move production to Mexico because laws there governing air- and water-quality standards are less stringent than in the United States and Canada. Mexico has adopted regulations to reduce air pollution in Mexico City, but environmentalists charge that environmental protection laws are still not strictly enforced in Mexico.

Mexico faces its own challenges. Although much lower than in the United States, Mexican wages are higher than in China. Despite the higher site costs, however, Mexico still competes effectively with China because it has much lower shipping costs to the United States and Europe than does China. Mexico has also signed free trade agreements with many other countries in addition to the United States.

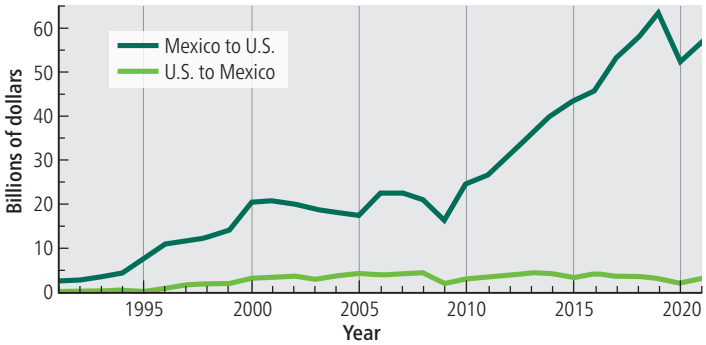


▲ **FIGURE 11-63 DISTRIBUTION OF VEHICLE FINAL ASSEMBLY AND ENGINE PLANTS AMONG CANADA, MEXICO, AND THE UNITED STATES**

▼ **FIGURE 11-64 VEHICLE PRODUCTION MEXICO**



▼ **FIGURE 11-65 U.S.-MEXICO TRADE IN VEHICLES**



▼ **FIGURE 11-66 FREIGHT SHIPPED BY TRAIN FROM MEXICO TO THE UNITED STATES**

11 Summary & Review

KEY ISSUE

11.1 | Where Are Industries Distributed?

- The world's three principal industrial regions are Europe, North America, and East Asia.
- The concept of manufacturing goods in a factory originated with the Industrial Revolution in the United Kingdom.
- Products are shipped by boat, rail, truck, or air. The optimal shipping choice depends on the distance something is being transported.

KEY ISSUE

11.2 | Why Are Site Factors Important for Industries?

- A company ordinarily considers a combination of site and situation factors in deciding where to locate a factory or to find suppliers.
- Site factors are related to the costs of production inside a factory.
- Site factors derive from distinctive features of a particular place, including labor, capital, and land.

KEY ISSUE

11.3 | Why Are Situation Factors Important for Industries?

- Situation factors involve transporting inputs into a factory and transporting manufactured goods to the markets.
- Manufacturers tend to locate near their source of inputs if their product is bulk-reducing.
- Manufacturers tend to locate near their markets if their product is bulk-gaining, shipped to only one customer, or highly perishable.

KEY ISSUE

11.4 | Why Has the Distribution of Industries Changed?

- Industry is increasing in some developing countries and in some areas within developed regions.
- Site factors, especially labor costs, have stimulated industrial growth in new regions.
- China has become the world's leading industrial country.

Thinking Geographically

KEY ISSUE

11.1 | Where Are Industries Distributed?

What might be the advantages and challenges of utilizing drones for just-in-time delivery to factories?

▲ **FIGURE 11CR-1** DRONE DELIVERING A PACKAGE

KEY ISSUE

11.2 | Why Are Site Factors Important for Industries?

Check your clothing labels. Do you have any clothing made in the United States or Western Europe? What might account for that clothing being made in a developed country rather than in Asia or Latin America?

▲ **FIGURE 11CR-2** HARRIS TWEED, MADE IN THE ISLE OF HARRIS, SCOTLAND

KEY ISSUE

11.3 | Why Are Situation Factors Important for Industries?

▲ **FIGURE 11CR-3** VEHICLE IDENTIFICATION NUMBER

Every car has a 17-digit vehicle Identification number (VIN) that tells a lot about the vehicle, such as where the vehicle was assembled. Enter the VIN in a search engine for a vehicle owned by you, a family member, or a friend to find out where it was made. Locate the region of assembly for the vehicle. Was the location where the vehicle was assembled important to the purchaser of the vehicle? Why or why not?

KEY ISSUE

11.4 | Why Has the Distribution of Industries Changed?

Refer to Figure 8-44 about landlocked states and Figure 8-69 about regime types. How might the distribution of landlocked states and regime types impact the ability of African countries to emerge as new industrial regions?

▲ **FIGURE 11CR-4** BICYCLE FACTORY, BURKINA FASO, A LANDLOCKED STATE

Key Terms

Apparel An article of clothing.

Break-of-bulk point A location where transfer is possible from one mode of transportation to another.

Bulk-gaining industry An industry in which the final product weighs more or comprises a greater volume than the inputs.

Bulk-reducing industry An industry in which the final product weighs less or comprises a lower volume than the inputs.

Cottage industry Manufacturing based in homes rather than in factories, most common prior to the Industrial Revolution.

Fordist production A form of mass production in which each worker is assigned one specific task to perform repeatedly.

Industry The manufacturing of goods in a factory.

Just-in-time delivery Shipment of parts and materials to arrive at a factory moments before they are needed.

Labor-intensive industry An industry for which labor costs comprise a high percentage of total expenses.

Maquiladora A factory built by a U.S. company in Mexico near the U.S. border to take advantage of the much lower labor costs in Mexico.

New international division of labor Transfer of some types of jobs, especially those requiring low-paid, less-skilled workers, from developed countries to developing countries.

Outsourcing A decision by a corporation to turn over much of the responsibility for production to independent suppliers.

Post-Fordist production Adoption by companies of flexible work rules, such as the allocation of workers to teams that perform a variety of tasks.

Right-to-work law A U.S. law that prevents a union and a company from negotiating a contract that requires workers to join the union as a condition of employment.

Site factors Location factors related to the costs of factors of production inside a plant, such as land, labor, and capital.

Situation factors Location factors related to the transportation of materials into and from a factory.

Textile A fabric made by weaving, used in making clothing.

Vertical integration An approach typical of traditional mass production in which a company controls all phases of a highly complex production process.

International Geographic Mapping Explorations

Assembling an Apple Product

The journey of an iPhone from raw materials to a consumer's pocket covers much of the globe. Around 98 percent of the parts in an iPhone are made by around 200 companies that work with Apple. Many of these parts are made in China. One example of an electronic parts supplier is Wistron Infocomm, which has factories in several cities in China, including Taizhou.

FIGURE 11CR-5 APPLE IPHONE SUPPLIER WISTRON INFOCOMM FACTORY IN TAIZHOU, CHINA The worker is wearing dust-proof clothing to protect the parts from contamination.

. . . . Geographers recognize that factories are found in particular locations based on a combination of situation and site factors. Situation and site factors induce most factories to locate in settlements, which we will see in the next chapter also contain services such as shops and schools, as well as factories. . . .

12 Settlements & Services

KEY ISSUES

12.1 Where Are Settlements & Services Distributed?

Settlements are either rural or urban. An increasing percentage of people live in urban settlements. Settlements are centers for services, the types of which are consumer, business, and public.

12.2 Why Do Services Cluster in Settlements?

Rural settlements can be dispersed or clustered. Urban settlements became service centers in ancient times.

12.3 Where Are Business Services Distributed?

Business services tend to cluster in a relatively small number of large settlements, known as global cities. Developing countries specialize in some forms of business services.

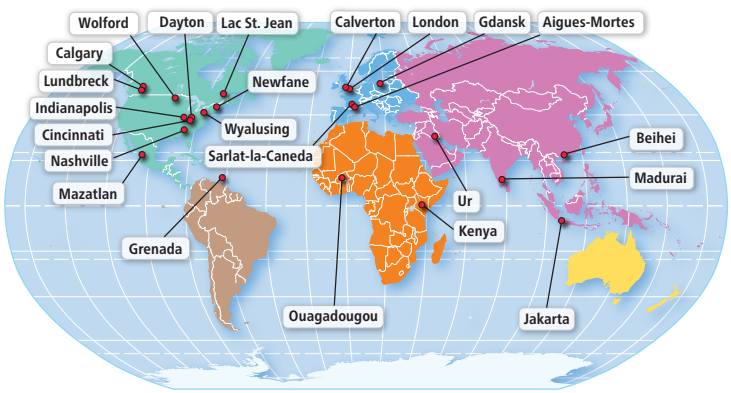
12.4 Where Are Consumer Services Distributed?

Consumer services are distributed in a regular pattern, especially in developed countries. Central place theory helps to explain the distribution of consumer services.

▶ Consumer services, Mexico City.

Most employed people in the world work in services, such as shops, offices, restaurants, universities, and hospitals. Services are closely linked with settlements because most services are located in settlements. Geography plays an especially important role in the provision of services. For example, service providers apply geographic principles to determine the best places to locate.

LOCATIONS EXPLORED IN THIS CHAPTER



KEY ISSUE

12.1 | Where Are Settlements & Services Distributed?

Flying across the United States on a clear night, you look down on the lights of settlements, large and small. You see small clusters of lights from villages and towns and large, brightly lit metropolitan areas. It may appear that the light clusters are random, but geographers discern a regular pattern in them. These regularities have been documented, and concepts from economic geography can be applied to understand why this pattern exists. The regular distribution observed over North America and over other developed countries is not seen in developing countries. Geographers explain this difference and why the absence of a regular pattern is significant.

Settlements, Services, & Geography

Learning Outcome 12.1.1 Describe patterns of growth of urban settlements.

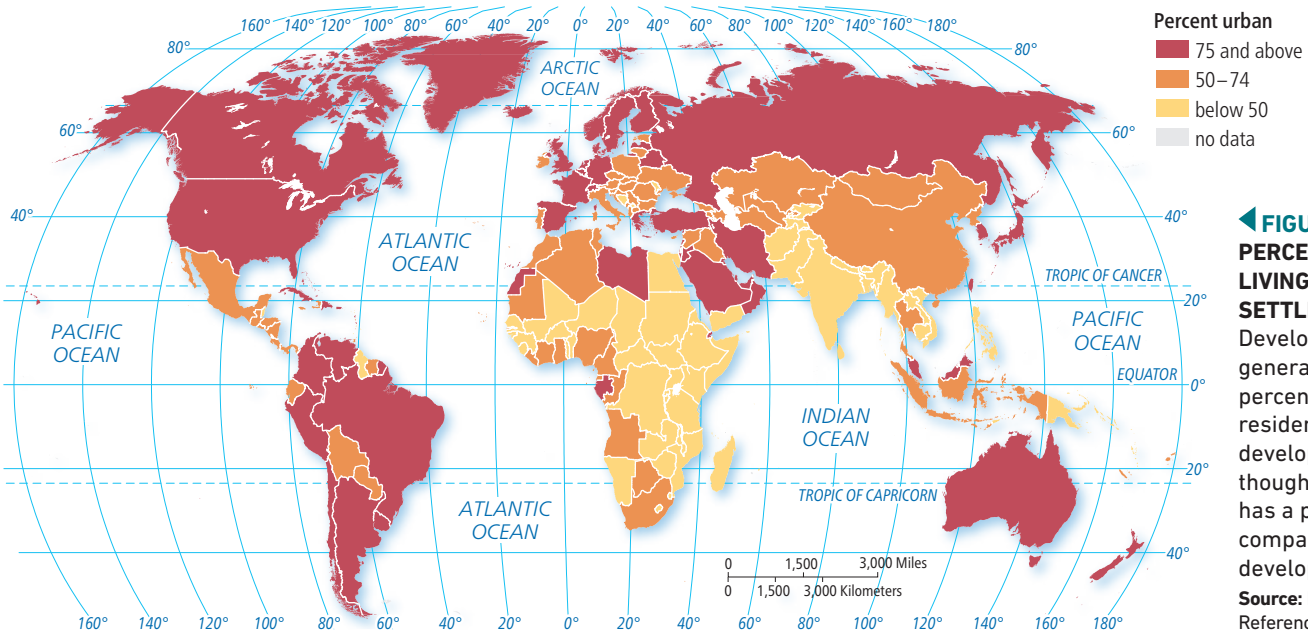
A **settlement** is a permanent collection of buildings where people reside, work, and obtain services. While they occupy just a very small percentage of Earth's surface, well under 1 percent, settlements are home to nearly all humans because few people live in isolation.

▲ **FIGURE 12-1 BEIHAI, CHINA** The world's fastest-growing urban settlement is located in southeastern China, 100 kilometers (60 miles) from the border with Vietnam.

Urban Settlements

In developing countries, a large percentage of people work in the primary sector, growing food (see Chapter 10). A **rural settlement** is a community where most people are engaged in agriculture. An **urban settlement** is a community where people are employed in secondary- and tertiary-sector jobs. Approximately 57 percent of the world's population live in an urban settlement (Figure 12-1).

The percentage of people living in urban settlements reflects a country's level of development. In developed countries, 79 percent live in urban settlements, compared to 53 percent in developing countries (Figure 12-2). In Latin America, a developing region, the percentage living in urban settlements, 81 percent, is actually higher than in developed countries. On the other hand, only 42 percent live in urban settlements in sub-Saharan Africa and 37 percent in South Asia. Not by coincidence these two developing regions have the lowest HDIs, according to the U.N. (see Chapter 9).



◀ **FIGURE 12-2 PERCENTAGE LIVING IN URBAN SETTLEMENTS** Developing countries generally have lower percentages of urban residents than do developed countries, though Latin America has a percentage comparable to that of developed countries.
Source: Population Reference Bureau

Increase in Percentage Urban

The process by which the population of urban settlements grows is known as **urbanization**. The urbanization process has two dimensions:

- An increase in the percentage of people living in urban settlements.
- An increase in the number of people living in urban settlements.

The distinction between these two factors is important because they occur for different reasons and have different global distributions.

The percentage living in urban settlements increased rapidly during the nineteenth and twentieth centuries, from 3 percent in 1800 to 6 percent in 1850, 14 percent in 1900, 30 percent in 1950, and 45 percent in 2000. The population of Earth's urban settlements exceeded that of rural settlements for the first time in human history around 2008.

The higher percentage of urban residents in developed countries is a result of changes in economic structure during the past two centuries—first the Industrial Revolution in the nineteenth century and then the growth of services in the twentieth. The percentage of urban dwellers is high in developed countries because over the past 200 years, rural residents have migrated from the countryside to work in the factories and services that are concentrated in cities.

The need for fewer farm workers has pushed people out of rural areas, and rising employment opportunities in manufacturing and services have lured them into urban areas. Because people reside in either an urban settlement or a rural settlement, an increase in the percentage living in urban areas has produced a corresponding decrease in the percentage living in rural areas.

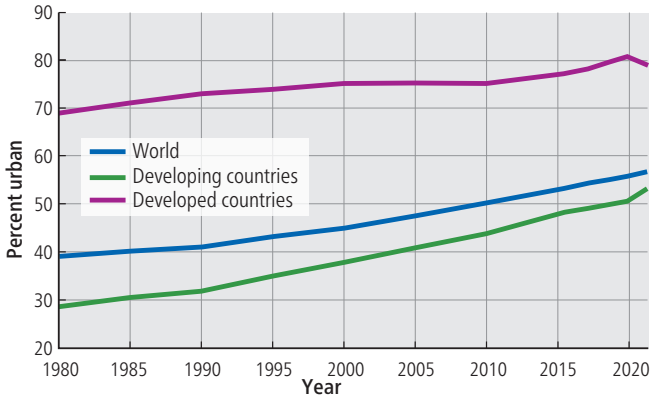
Figure 12-3 shows that the gap in urbanization between developed and developing countries is closing. In 1980, 69 percent lived in urban areas in developed countries compared to only 29 percent in all developing countries, and 23 percent in sub-Saharan Africa and South Asia.

Pause & Reflect 12.1.1 What migration factor discussed in Chapter 3 might help to explain why the percentage of people in developed countries living in urban areas may not continue to increase?

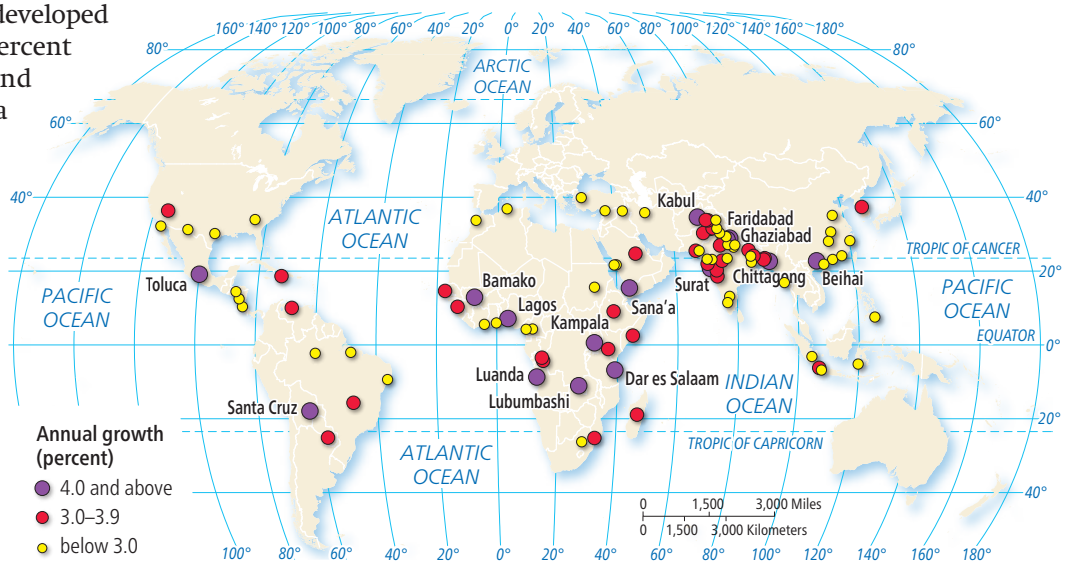
Rapidly-Growing Cities

All but 4 of the 100 fastest-growing urban settlements are in developing countries (Figure 12-4). Five of the 13 growing at more than 4 percent per year are in Africa, 3 are in India, 4 are elsewhere in Asia, and 1 is in Latin America. The four in developed countries include three in the United States (Las Vegas, Austin, and Atlanta) plus Suwon, South Korea. Worldwide, the three fastest-growing urban settlements are relatively unfamiliar places: Beihai, China (refer to Figure 12-1); Ghaziabad, India; and Sana'a, Yemen.

That developing countries dominate the lists of largest and fastest-growing urban settlements is remarkable because urbanization was once associated with economic development. In developing countries, migration from the countryside is fueling half the increase in population in urban settlements, even though job opportunities may not be available. The other half results from high natural increase rates (see Chapter 2); in Africa, the natural increase rate accounts for three-fourths of urban growth and migration for one-fourth.



▲ **FIGURE 12-3 CHANGING PERCENTAGE LIVING IN URBAN SETTLEMENTS** The percentage living in urban settlements is increasing more rapidly in developing countries, though the gap between developed and developing regions remains.
Source: Population Reference Bureau



▲ **FIGURE 12-4 WORLD'S 100 FASTEST-GROWING URBAN SETTLEMENTS** Nearly all are in developing countries.
Source: CityMayors.com

Increase in Size of Settlements

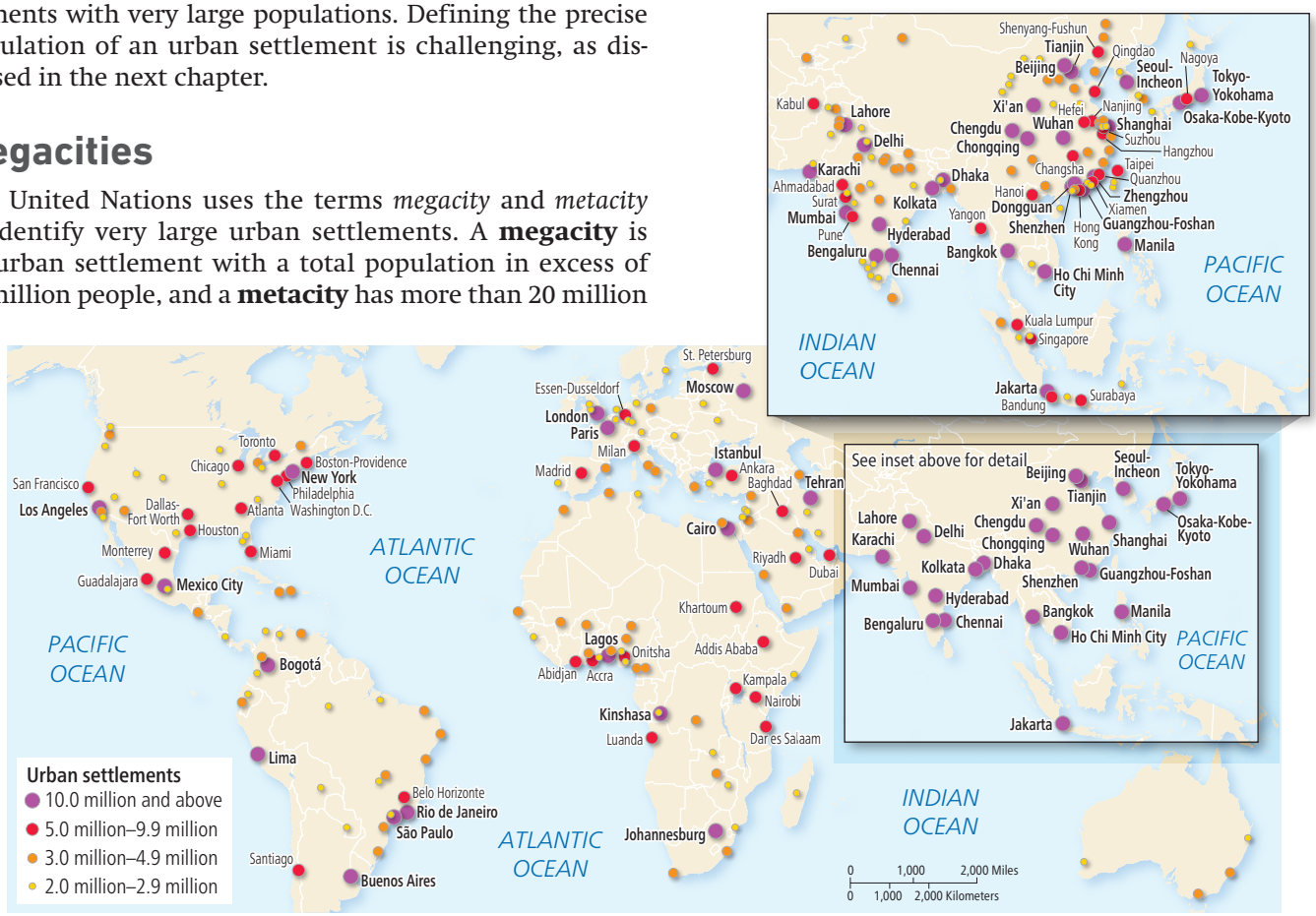
Learning Outcome 12.1.2 Identify the location of the largest settlements and differences between urban and rural settlements.

Urbanization has resulted in the development of urban settlements with very large populations. Defining the precise population of an urban settlement is challenging, as discussed in the next chapter.

Megacities

The United Nations uses the terms *megacity* and *metacity* to identify very large urban settlements. A **megacity** is an urban settlement with a total population in excess of 10 million people, and a **metacity** has more than 20 million people. The U.N. identifies 44 megacities and further identifies 12 of those 44 as metacities.

Developed countries may have a higher percentage of urban residents (refer to Figure 12-1), but developing countries have more of the very large urban settlements. In 1900, after diffusion of the Industrial Revolution from the United Kingdom to today's developed countries, all 10 of the world's largest cities were in Europe and North America. Now, no metacity is in Europe, and only one – New York – is in North America. Two other metacities are in developed countries of East Asia – Tokyo and Seoul. The other nine metacities are in developing countries – Cairo, Delhi, Guangzhou, Jakarta, Manila, Mexico City, Mumbai, São Paulo, and Shanghai. Developed countries have only 7 of the world's 44 megacities – the above 3 metacities, plus Osaka, London, Los Angeles, and Paris. The other 37 megacities are in developing countries (Figure 12-5).



▲ **FIGURE 12-5 METACITIES AND MEGACITIES** Most of the world's largest settlements are in developing countries, especially in East and South Asia and Latin America.

▼ **FIGURE 12-6 JAKARTA, INDONESIA** Possibly the next urban settlement to be the world's largest.

London grabbed the title of world's largest urban settlement during the nineteenth century, as part of the Industrial Revolution, and was the first urban settlement to exceed 5 million, around 1900. New York held the title of world's largest settlement briefly during the mid-twentieth century and was the first to exceed 10 million, around 1940. Tokyo is now considered to be the world's largest urban settlement. However, at current growth rates, Jakarta, Indonesia, may become the world's largest by 2030 (Figure 12-6).

Pause & Reflect 12.1.2 How might differences in natural increase rates between Indonesia and Japan impact growth rates for Jakarta and Tokyo?

Urban-Rural Differences

A century ago, social scientists observed striking differences between urban and rural residents. Louis Wirth argued during the 1930s that an urban dweller follows a different way of life than does a rural dweller. Thus, Wirth defined a city as a permanent settlement that has three characteristics: large size, high population density, and socially heterogeneous people. These characteristics produced differences in the social behavior of urban and rural residents (Figure 12-7).

Large Size. If you live in a rural settlement, you know most of the other inhabitants and may even be related to many of them. The people with whom you relax are probably the same ones you see in local shops and at church. In contrast, if you live in an urban settlement, you know only a small percentage of the other residents. You meet most of them in specific roles – your supervisor, your lawyer, your supermarket cashier, your electrician. Most of these relationships are contractual: You are paid wages according to a contract, and you pay others for goods and services. Consequently, the large size of an urban settlement produces different social relationships than those formed in rural settlements.

High Density. Urban areas have much higher densities of population, housing, and services than do rural settlements. High density produces social consequences for urban residents, according to Wirth. The only way that a large number of people can be supported in a small area is through specialization. Each person in an urban settlement plays a special role or performs a specific task to allow the complex urban system to function smoothly. At the same time, high density also encourages social groups to compete to occupy the same territory.

Social Heterogeneity. The larger the settlement, the greater the **social heterogeneity**, which Wirth defined as people from varied racial, ethnic, and national backgrounds and with diverse lifestyle preferences. A person has greater freedom in an urban settlement than in a rural settlement to pursue an unusual profession or cultural interest. In a rural settlement, such individual expressions might be noticed and scorned, but urban residents are more accepting of diverse social behavior. Regardless of values and preferences, in a large urban settlement, individuals can find people with similar interests. But despite the freedom and independence of an urban settlement, people may also feel lonely and isolated. Residents of a crowded urban settlement often feel that they are surrounded by people who are indifferent and reserved.

Wirth's three-part distinction between urban and rural settlements may still apply in some developing countries. But in developed countries, social distinctions between urban and rural life have blurred. According to Wirth's definition, nearly everyone in a developed country now is urban. All but 1 percent of workers in developed societies hold "urban" types of jobs. Nearly universal ownership of motor vehicles, electronic devices, and other modern communications and transportation systems has also reduced the differences between urban and rural lifestyles in developed countries. Almost regardless of where you live in a developed country, you have access to urban jobs, services, culture, and recreation.

(a)

(b)

▲ **FIGURE 12-7 COMPARING RURAL AND URBAN SETTLEMENTS** (a) A rural settlement, Wolford, North Dakota, has a relatively small size, low density, and minimal social heterogeneity; (b) An urban settlement, London, United Kingdom, has a relatively large size, high density, and considerable social heterogeneity.

Services in Settlements

Learning Outcome 12.1.3 Describe the three types of services.

Most people in developed countries work in places that provide services, such as shops, offices, restaurants, universities, and hospitals. These are examples of the tertiary, or service, sector of the economy. Services generate more than two-thirds of GDP in most developed countries, compared to around one-half in developing countries (Figure 12-8 and refer to Figure 9-6). Logically, the distribution of service sector workers is opposite the distribution of primary sector workers (refer to Figure 10-19).

The regular pattern of settlements in developed countries reflects where services are provided. A **service** is any activity that fulfills a human want or need and returns money to those who provide it. Geographers see a close link between services and settlements because providing services is a principal reason that settlements exist.

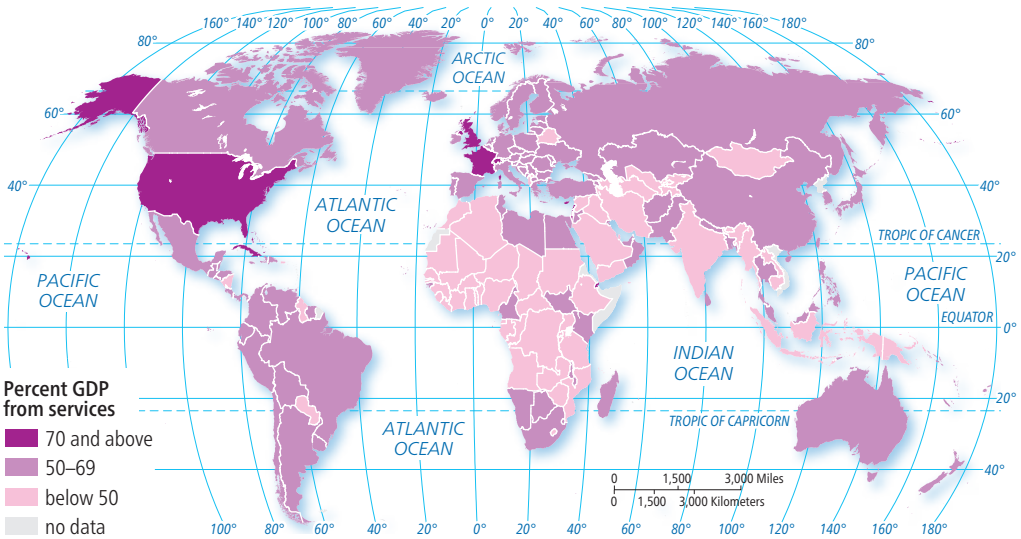
In developed countries three-fourths of the workers are employed in the tertiary, or service, sector of the economy, defined in Chapter 9 as the provision of goods and services to people in exchange for payment. In contrast, around one-half of the labor force in developing countries provides services. Tertiary sector jobs are mostly located in urban settlements.

In developed countries, people purchase food at supermarkets or restaurants. The people employed at the supermarkets and restaurants are examples of service-sector workers, and the customers pay for the food with money earned in other service-sector jobs, such as retailing, banking, law, education, and government.

However, if services were located merely where people lived, then China and India would have the most rather than the United States and other developed countries. Services cluster in developed countries because more people who are able to buy services live there. Within developed countries, larger cities offer a larger scale of services than do small towns because more customers reside there (Figure 12-9).

Explaining why services are clustered in settlements is at one level straightforward for geographers. In geographic terms, only one locational factor is critical for a service: proximity to the market. The optimal location of industry, described in Chapter 11, requires balancing a number of site and situation factors, but the optimal location for a service is simply near its customers. Thus, a settlement is where customers are clustered.

On the other hand, locating a service calls for far more precise geographic skills than locating a factory. The optimal location for a factory may be an area of several hundred square kilometers (or miles), whereas the optimal location for a service may be a very specific place, such as a street corner.



▲ **FIGURE 12-8 PERCENTAGE OF GDP FROM SERVICES** Services account for more than two-thirds of GDP in developed countries, compared to around one-half in developing countries.
Source: World Bank

(a) (b)

▲ **FIGURE 12-9 MORE SERVICES IN LARGER SETTLEMENTS** (a) Calgary, Alberta, metropolitan area has a population of 1.5 million; (b) Lundbreck, Alberta, has a population of 289.

Types of Services

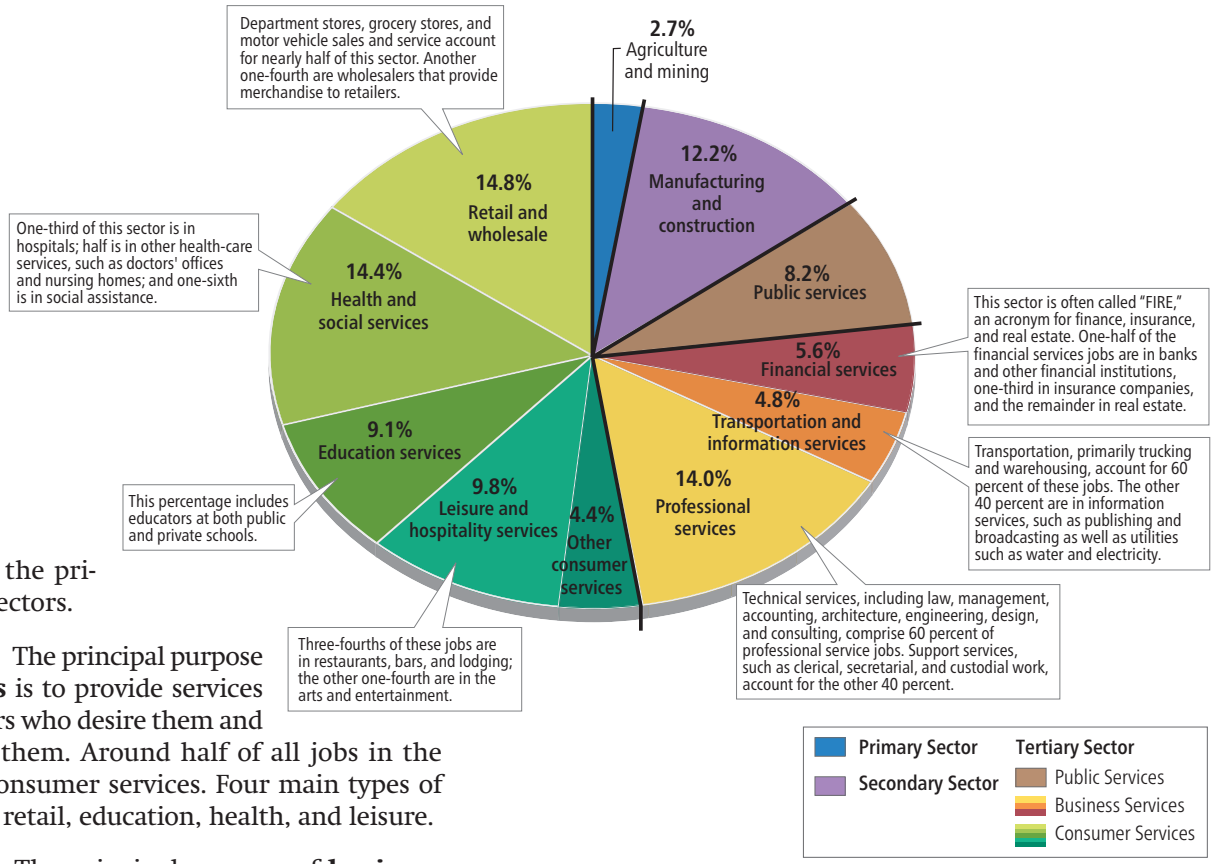
The service sector of the economy is subdivided into three types – consumer services, business services, and public services. Each of these tertiary sectors is subdivided into several major subsectors (Figure 12-10). A smaller number of people work on farms or in factories, the primary and secondary sectors.

Consumer Services. The principal purpose of **consumer services** is to provide services to individual consumers who desire them and can afford to pay for them. Around half of all jobs in the United States are in consumer services. Four main types of consumer services are retail, education, health, and leisure.

Business Services. The principal purpose of **business services** is to facilitate the activities of other businesses. One-fourth of all jobs in the United States are in business services. Professional services, financial services, information services, and transportation services are the main types of business services.

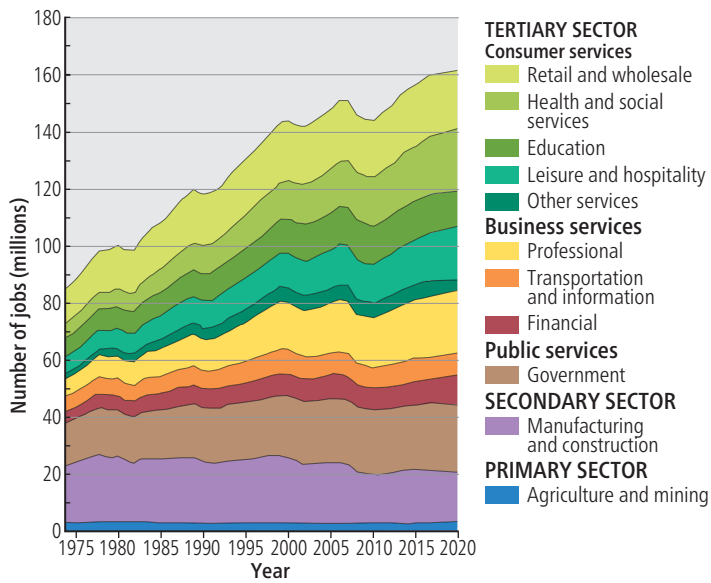
Public Services. The purpose of **public services** is to provide security and protection for citizens and businesses. About 8 percent of all U.S. jobs are in the public sector. Excluding educators, around one-fourth of public-sector employees work for the federal government (including the U.S. Postal Service), one-fourth for one of the 50 state governments, and half for one of the tens of thousands of local governments.

The distinction among services is not absolute. For example, individual consumers use business services, such as consulting lawyers and keeping money in banks, and businesses use consumer services, such as purchasing stationery and staying in hotels. Still, geographers find the classification useful because the various types of services have different distributions, and different factors influence locational decisions.



▲ **FIGURE 12-10 U.S. EMPLOYMENT BY SECTOR** Approximately one-half of jobs in the United States are in consumer services and one-fourth in business services. The remainder are in public services, manufacturing, and agriculture.

Source: Bureau of Labor Statistics



▲ **FIGURE 12-11 CHANGE IN U.S. EMPLOYMENT** Jobs have increased in the tertiary sector, especially consumer services.

Changes in Job Sectors

Figure 12-11 shows changes in U.S. employment. All the growth in employment in the United States has been in services, whereas employment in primary- and secondary-sector activities has declined. Within business services, jobs expanded most rapidly in professional services and more slowly in finance and transportation services because of improved efficiency; fewer workers are needed to run trains and answer phones, for example. On the consumer services side, the most rapid increases since 2000 have been in the provision of health care and leisure and hospitality services.

Pause & Reflect 12.1.3 In which sectors of the economy do you or members of your family work? If in the service sector, in which types of services are these jobs?

KEY ISSUE

12.2 | Why Do Services Cluster in Settlements?

Services are clustered in settlements. Rural settlements are centers for agriculture and provide a small number of services. Urban settlements are centers for consumer and business services. Around half of the people in the world live in rural settlements and the other half in urban settlements.

Services in Rural Settlements

Learning Outcome 12.2.1 Compare dispersed and clustered rural settlements.

Rural settlements are either clustered or dispersed:

- A **dispersed rural settlement** is characterized by farmers living on individual farms isolated from neighbors rather than alongside other farmers in settlements.
- A **clustered rural settlement** is an agricultural-based community in which a number of families live in close proximity to each other, with fields surrounding the collection of houses and farm buildings.

Dispersed Rural Settlements

Isolated farms are typical of most of the rural United States. A dispersed pattern developed from the time of initial settlement of the Middle Atlantic colonies because most immigrants to these colonies arrived individually rather than as members of a cohesive group, as was the case in New England. As people moved westward from the Middle Atlantic region, they took with them their preference for isolated individual farms. Land was plentiful and cheap, so people bought as much as they could manage (Figure 12-12).

In Europe, some clustered settlements were converted to dispersed settlements in order to make agriculture more efficient. Clustered rural settlements worked when the population was low, but they had no spare land to meet the needs of a growing population. With the introduction of machinery, farms operated more efficiently at a larger scale. For example, in the United Kingdom, the **enclosure movement** between 1750 and 1850 resulted in the consolidation of individually owned strips of land surrounding villages into large farms owned by single individuals (Figure 12-13). When necessary, the government forced people to give up their holdings. As displaced farmers moved to urban settlements, the population of clustered rural settlements declined drastically. Because the enclosure movement coincided with the Industrial Revolution, villagers displaced from farming became workers in urban factories.

▲ **FIGURE 12-12 DISPERSED RURAL SETTLEMENT: UNITED STATES** Wyalusing, Pennsylvania.

▲ **FIGURE 12-13 RURAL SETTLEMENT: UNITED KINGDOM** Calverton was originally a clustered rural settlement, but during the enclosure movement, the surrounding fields were consolidated into large farms.

Clustered Rural Settlements

A clustered rural settlement typically includes homes, barns, tool sheds, and other farm structures, plus consumer services, such as religious structures, schools, and shops. A handful of public and business services may also be present in a clustered rural settlement.

Each person living in a clustered rural settlement is allocated strips of land in the surrounding fields. Homes, public buildings, and fields in a clustered rural settlement are arranged according to local cultural and physical characteristics. Clustered rural settlements are often arranged in one of two types of patterns, circular or linear.

Circular Clustered Rural Settlements. A circular clustered rural settlement consists of a central open space surrounded by structures. In sub-Saharan Africa, the Maasai people, who are pastoral nomads, build circular settlements known as kraal (Figure 12-14). Women have the principal responsibility for constructing them. The kraal villages have enclosures for livestock in the center, surrounded by a ring of houses. Von Thünen observed this circular pattern in Germany in his landmark agricultural studies in the early nineteenth century (refer to Figure 10-37).

Linear Clustered Rural Settlements. Linear rural settlements comprise buildings clustered along a road, river, or dike to facilitate communications. The fields extend behind the buildings in long, narrow strips. Long-lot farms can be seen today along the St. Lawrence River in Québec (Figure 12-15). Québec got the system from the French.

Clustered New England Rural Settlements. Clustered rural settlements were characteristic of colonial New England. New England colonists typically traveled from England in a group, and they wanted to live close together to reinforce common cultural and religious values. The contemporary New England landscape contains remnants of the old clustered rural settlement pattern. Many New England towns still have a central common surrounded by the church, school, and various houses (Figure 12-16).

Pause & Reflect 12.2.1 In which sector of the economy—primary, secondary, or tertiary—would you expect most of the residents of Newfane, Vermont, and Calverton, United Kingdom, to be employed? Why?

▲ **FIGURE 12-14 CLUSTERED CIRCULAR RURAL SETTLEMENT**
Kraal village, Kenya.

▲ **FIGURE 12-15 CLUSTERED LINEAR RURAL SETTLEMENT**
Lac St. Jean, Québec.

▲ **FIGURE 12-16 CLUSTERED NEW ENGLAND RURAL SETTLEMENT**
Newfane, Vermont, looking south.

Services in Early Urban Settlements

Learning Outcome 12.2.2 Identify important ancient and medieval urban settlements.

Before the establishment of permanent settlements as service centers, people lived as nomads, migrating in small groups across the landscape in search of food and water. They gathered wild berries and roots or killed wild animals for food (see Chapter 10). At some point, groups decided to build permanent settlements. Several families clustered together in a rural location and obtained food in the surrounding area.

Settlements may have originated in Mesopotamia, part of the Fertile Crescent of Southwest Asia (refer to Figure 8-7), and diffused at an early date west to Egypt and east to China and to South Asia's Indus Valley. Or settlements may have originated independently in each of the four hearths. In any case, from these four hearths, settlements diffused to the rest of the world.

Services in the Earliest Settlements

What services would nomads require? Why would they establish permanent settlements to provide these services? No one knows the precise sequence of events through which settlements were established to provide services. Based on archaeological research, settlements probably originated to provide consumer and public services. Business services came later.

Early Consumer Services. The earliest permanent settlements may have been established to offer consumer services, specifically places to bury the dead. Having established a permanent resting place for the dead, the group might then install priests at the site to perform the service of saying prayers for the deceased. This would have encouraged the building of structures – places for ceremonies and dwellings. By the time recorded history began about 5,000 years ago, many settlements existed, and some of them featured places of worship (Figure 12-17).

Early Business Services. Early urban settlements were places where groups could store surplus food and trade with other groups. People brought plants, animals, and minerals as well as tools, clothing, and containers to the urban settlements, and exchanged them for items brought by others. To facilitate this trade, officials in the settlement set fair prices, kept records, and created currency.

Early Public Services. Early settlements housed political leaders as well as defense forces to guard the residents of the settlement and defend the surrounding hinterland from seizure by other groups.

Ancient Urban Settlements

Settlements were first established in the eastern Mediterranean about 2500 B.C.E. (Figure 12-18). These settlements were trading centers for the thousands of islands dotting the Aegean Sea and the eastern Mediterranean and provided the government, military protection, and other public services for their surrounding hinterlands. They were organized into city-states, which were defined in Chapter 8 as independent self-governing communities that included the settlement and nearby countryside.

Settlements were places to house families and store possessions, permitting unburdened males to travel farther and faster in their search for food. Women kept "home and hearth," making household objects, such as pots, tools, and clothing, and educating the children. People also needed tools, clothing, shelter, containers, fuel, and other material goods. Settlements therefore became manufacturing centers. Men gathered the materials needed to make a variety of objects: stones for tools and weapons, grass for containers and matting, animal hair for clothing, and wood for shelter and heat. Women used these materials to manufacture household objects and maintain their dwellings.

Pause & Reflect 12.2.2 In prehistoric times, before the invention of settlements, why might caves have played an important role in the lives of early humans?

▲ **FIGURE 12-17 THE ZIGGURAT OF UR IN PRESENT-DAY IRAQ** Constructed as part of a temple complex around 2000 B.C.E.

▲ **FIGURE 12-18 MEMPHIS, EGYPT** Possibly the world's largest urban settlement around 5,000 years ago.

Medieval Urban Settlements

The rise of the Roman Empire encouraged urban settlement. With much of Europe and Southwest Asia & North Africa under Roman rule, settlements were established as centers of administrative, military, and other public services as well as retail and other consumer services. Trade was encouraged through transportation and utility services, notably construction of many roads and aqueducts, and the security the Roman legions provided. Rome—the empire's center for administration, commerce, culture, and all other services—was the world's most populous city 2,000 years ago (Figure 12-19).

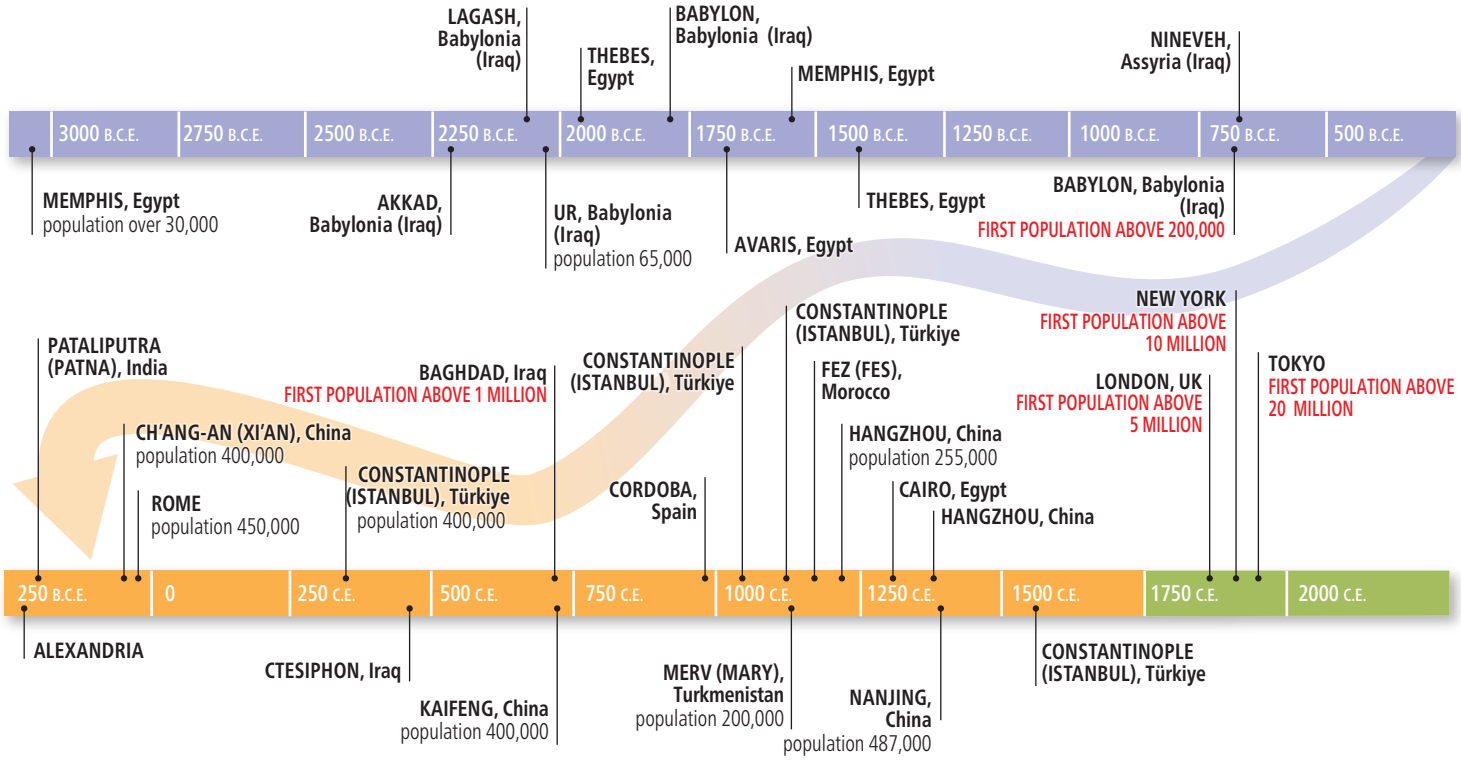
With the fall of the Roman Empire in the fifth century C.E., urban settlements declined. The empire's prosperity had rested on trading in the secure environment of imperial Rome. But with the empire fragmented under hundreds of rulers, trade diminished. Large urban settlements shrank or were abandoned. For several hundred years, Europe's cultural heritage, such as books and art, was preserved largely in monasteries and isolated rural areas.

Urban life began to revive in Europe in the eleventh century, as feudal lords established new urban settlements. The lords gave residents charters of rights with which to establish independent cities in exchange for their military service. Both the lord and the urban residents benefited from this arrangement. The lord obtained people to defend his territory at less cost than maintaining a standing army. For their part, urban residents preferred periodic military service to the burden faced by rural serfs, who farmed the lord's land and could keep only a small portion of their own agricultural output.

With their newly won freedom from the relentless burden of rural serfdom, the urban dwellers set about expanding trade. Surplus from the countryside was brought into the city for sale or exchange, and markets were expanded through trade with other free cities. The trade among different urban settlements was enhanced by new roads and greater use of rivers. By the fourteenth century, Europe was covered by a dense network of small market towns serving the needs of particular lords.

The largest medieval European urban settlements served as power centers for the lords and church leaders as well as major market centers. The most important public services, such as palaces and churches, were arranged around a central market square. The tallest and most elaborate structures were usually churches, many of which still dominate the landscape of smaller European towns. Medieval settlements were often surrounded by walls (Figure 12-20).

▲ **FIGURE 12-20 MEDIEVAL WALLED URBAN SETTLEMENT** Aigues-Mortes, France.

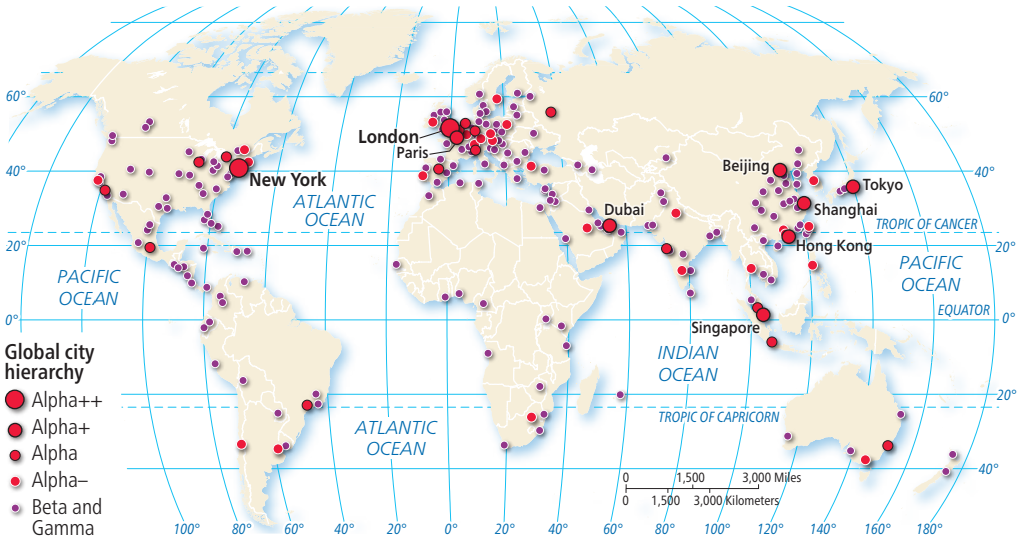


▲ **FIGURE 12-19 LARGEST URBAN SETTLEMENTS THROUGH HISTORY** In ancient times, the world's largest urban settlements were in the Fertile Crescent. After the collapse of the Roman Empire, most of the world's largest urban settlements were clustered in China. During the past 300 years, the world's largest urban settlement has been London, New York, or Tokyo.

KEY ISSUE

12.3 | Where Are Business Services Distributed?

Every urban settlement provides consumer services to people in a surrounding area, but not every settlement of a given size has the same number and types of business services. Business services disproportionately cluster in a handful of urban settlements, and individual settlements specialize in particular business services.



▲ **FIGURE 12-21 GLOBAL CITIES** Geographers distinguish various ranks of global cities. London and New York, the two dominant global cities, are ranked as alpha++. Other alpha, beta, and gamma cities play somewhat less central roles in the provision of services than the two dominant global cities. Cities ranked alpha++ and alpha+ are labeled on the map.

Hierarchy of Business Services

Learning Outcome 12.3.1
Explain the clustering of business services in global cities.

Geographers identify a handful of urban settlements known as global cities (also called world cities) that play an especially important role in global business services. A **global city** is a major center for the provision of services in the global economy. Global cities can be subdivided according to a number of criteria.

▲ **FIGURE 12-22 GLOBAL CITIES IN NORTH AMERICA** Atop the hierarchy of business services is New York, followed by Chicago, Los Angeles, and Toronto.

Ranking Global Cities

Global cities are divided into three levels: alpha, beta, and gamma. Alpha cities are the primary nodes in the global economic network. Beta and gamma cities are smaller global cities that link economic regions into the global network. These three levels are further subdivided (Figure 12-21). The same hierarchy of business services can be used within individual countries, including the United States (Figure 12-22). A combination of factors is used to identify and rank global cities:

- **Economic factors.** Economic factors include the number of headquarters for multinational corporations, financial institutions, and law firms that influence the global economy.
- **Political factors.** Political factors include hosting headquarters for international organizations and capitals of countries that play a leading role in international events.
- **Cultural factors.** Cultural factors include the presence of renowned cultural institutions, influential media outlets, sports facilities, and educational institutions.
- **Infrastructure factors.** Infrastructure factors include rail terminals, interstate highway junctions, international airports, health-care facilities, and advanced communications systems. These factors facilitate communication with coworkers, clients, and customers around the world. Technology was expected to reduce the need for clustering of services in large cities, but it hasn't.

Business Services in Global Cities

Global cities are most closely integrated into the global economic system because they are at the center of the flow of information and capital. Business services that concentrate in disproportionately large numbers in global cities include:

- **Financial institutions.** As centers for finance, global cities attract the headquarters of the major banks, insurance companies, and specialized financial institutions where corporations obtain and store funds for expansion of production (Figure 12-23).
- **Headquarters of large corporations.** Shares of these corporations are bought and sold on stock exchanges located in global cities. Obtaining information in a timely manner is essential in order to buy and sell shares at attractive prices. Executives of manufacturing firms meeting far from the factories make key decisions concerning what to make, how much to produce, and what prices to charge. Support staff far from the factory accounts for the flow of money and materials to and from the factories. This work is done in offices in global cities.
- **Lawyers, accountants, and other professional services.** Professional services cluster in global cities to provide advice to major corporations and financial institutions. Advertising agencies, marketing firms, and other services concerned with style and fashion locate in global cities to help corporations anticipate changes in taste and to help shape those changes.

Consumer Services in Global Cities

Because of their large size, global cities have consumer services with extensive market areas, but they may have even more consumer services than large size alone would predict. A disproportionately large number of people with wealth live in global cities, so luxury and highly specialized products are especially likely to be sold there.

Leisure services of national significance are especially likely to cluster in global cities, in part because they require large thresholds and large ranges and in part because of the presence of patrons who are wealthy. Global cities typically offer the most plays, concerts, operas, night clubs, restaurants, bars, and professional sporting events (Figure 12-24). They contain the largest libraries, museums, and theaters.

Public Services in Global Cities

Global cities may be centers of national or international political power. Many are national capitals, and they contain mansions or palaces for the head of state, imposing structures for the national legislature and courts, foreign embassies, and offices for the government agencies (Figure 12-25). Also clustered in global cities are offices for groups having business with the government, such as representatives of foreign countries, trade associations, labor unions, and professional organizations.

Pause & Reflect 12.3.1 How would you expect an alpha city such as Chicago to differ from a beta city such as Houston or a gamma city such as Phoenix? Refer to Figure 12-22.

▲ **FIGURE 12-23 BUSINESS SERVICES IN LONDON** London's financial district is known as The City.

▲ **FIGURE 12-24 CONSUMER SERVICES IN LONDON** West End Theatre District.

▲ **FIGURE 12-25 PUBLIC SERVICES IN LONDON** Houses of Parliament.

Business Services in Developing Countries

Learning Outcome 12.3.2 Describe two types of business services in developing countries.

In the global economy, developing countries specialize in two distinctive types of business services: offshore financial services and back-office functions. These businesses tend to locate in developing countries for a number of reasons, including the presence of supportive laws, weak regulations, and low-wage workers.

Offshore Financial Services

Small countries, usually islands and microstates, exploit niches in the circulation of global capital by offering offshore financial services (Figure 12-26). Offshore centers provide two important functions in the global circulation of capital:

- **Taxes.** Taxes on income, profits, and capital gains are typically low or nonexistent in microstates with offshore financial services. Companies incorporated in an offshore center also have tax-free status, regardless of the nationality of the owners. The United States loses an estimated $100 billion in tax revenue each year because companies operating in the United States conceal their assets in offshore tax havens.
- **Privacy.** Bank secrecy laws in microstates with offshore financial services can help individuals and businesses evade disclosure of their capital in their home countries.

Corporations and people who may be accused of malpractice, such as a doctor or lawyer, or the developer of a collapsed building, can protect some of their assets from lawsuits by storing them in offshore centers. So can an individual who wants to protect assets in a divorce. Creditors cannot reach such assets in bankruptcy hearings. Short statutes of limitation protect offshore accounts from long-term investigation.

The privacy laws and low tax rates in offshore centers can also provide havens for tax dodges and other illegal schemes. By definition, the extent of illegal activities is unknown.

The International Monetary Fund, the Tax Justice Network's Financial Secrecy Index, and the Organisation for Economic Co-operation and Development all maintain lists of offshore financial services centers. These include:

- **British Overseas Territories and Crown Dependencies.** Examples of British Overseas Territories include Anguilla and Montserrat in the Caribbean and Gibraltar adjacent to Spain. Examples of Crown Dependencies of the United Kingdom include Jersey and the Isle of Man in the English Channel,
- **Places tied to countries other than the United Kingdom.** Examples of places controlled by countries other than the United Kingdom that operate as offshore financial services centers include Cook Island (controlled by New Zealand), Aruba and Curaçao (controlled by the Netherlands), and Hong Kong (controlled by China).
- **Independent island microstates.** Examples of independent island microstates include The Bahamas and Grenada in the Caribbean, Nauru and Vanuatu in the Pacific Ocean, and the Seychelles in the Indian Ocean (Figure 12-27).
- **Independent microstates that are not islands.** Examples of independent microstates that are not islands include Andorra and Liechtenstein in Europe, Belize and Panama in Latin America, and Bahrain and Lebanon in Asia.

FIGURE 12-26 OFFSHORE FINANCIAL SERVICE CENTERS Most offshore financial service centers are microstates or dependencies of other countries.

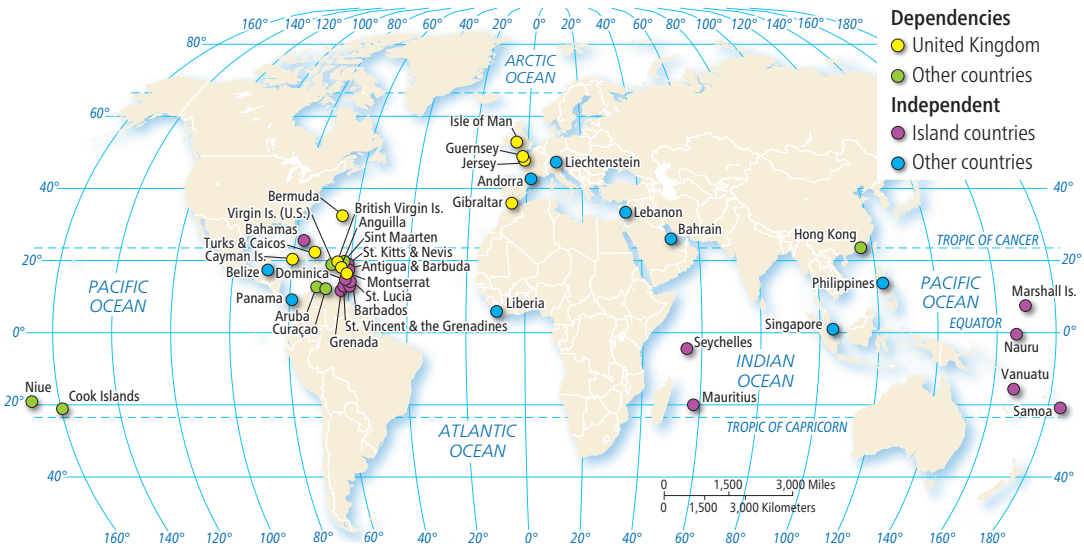


FIGURE 12-27 OFFSHORE FINANCIAL SERVICE CENTER: GRENADA

Business-Process Outsourcing

A second distinctive type of business service found in peripheral regions is back-office functions, also known as business-process outsourcing (BPO). Typical back-office functions include insurance claims processing, payroll management, transcription work, and other routine clerical activities (Figure 12-28). Back-office work also includes centers for responding to billing inquiries related to credit cards, shipments, and claims, or technical inquiries related to installation, operation, and repair.

Traditionally, companies housed their back-office staff in the same office building downtown as their management staff, or at least in nearby buildings. A large percentage of the employees in a downtown bank building, for example, would be responsible for sorting paper checks and deposit slips. Proximity was considered important to assure close supervision of routine office workers and rapid turnaround of information.

Rising rents downtown have induced many business services to move routine work to lower-rent buildings elsewhere. In most cases, sufficiently low rents can be obtained in buildings in suburbs or nearby small towns. For many business services, improved telecommunications is the most important factor in eliminating the need for spatial proximity.

Selected developing countries have attracted back offices for two reasons related to labor:

- **Low wages.** Most back-office workers earn a few thousand dollars per year – higher than wages paid in most other sectors of the economy in developing countries but only one-tenth the wages paid for workers performing similar jobs in developed countries. As a result, what is regarded as menial and dead-end work in developed countries may be considered relatively high-status work in developing countries and therefore may be able to attract better-educated, more-motivated employees in developing countries than would be possible in developed countries.
- **Ability to speak English.** Many developing countries offer lower wages than developed countries, but only a handful of developing countries possess a large labor force fluent in English.

In Asia, countries such as India, Malaysia, and the Philippines have substantial numbers of workers with English-language skills, a legacy of British and American colonial rule (Figure 12-29). The ability to communicate in English over the telephone is a strategic advantage in competing for back offices with neighboring countries, such as Indonesia and Thailand, where English is less commonly used. Familiarity with English is an advantage not only for answering the telephone but also for gaining a better understanding of the preferences of American consumers through exposure to English-language music, movies, and television. Major multinational companies such as American Express and General Electric have extensive back-office facilities in Asian countries.

Workers in back offices often must work late at night, when it's daytime in the United States, peak demand for inquiries. Many employees must arrive at work early and stay late because they lack their own transportation and depend on public transportation, which typically does not operate late at night. Sleeping and entertainment rooms may be provided at work to fill the extra hours.

Pause & Reflect 12.3.2 If it is 3 P.M. on a Tuesday where you live, what time and day is it at a call center in India? Refer to Figure 1-17.

▲ **FIGURE 12-28 CALL CENTER IN THE PHILIPPINES FOR AN AUSTRALIAN MOVING COMPANY**

▲ **FIGURE 12-29 CALL CENTER TRAINING** Madurai, India.

Economic Specialization of Settlements

Learning Outcome 12.3.3 Explain the concept of economic base.

Settlements can be classified by the distinctive types of economic activities that take place there. All sectors of the economy – be they the various types of agriculture, the various types of manufacturers, or the various types of services – have distinctive geographic distributions.

Economic Base

The economic activities in a settlement can be divided into two types:

- **Basic businesses** export primarily to customers outside the settlement.
- **Nonbasic businesses** serve primarily customers living in the same settlement.

The unique cluster of basic businesses in a settlement is its **economic base**.

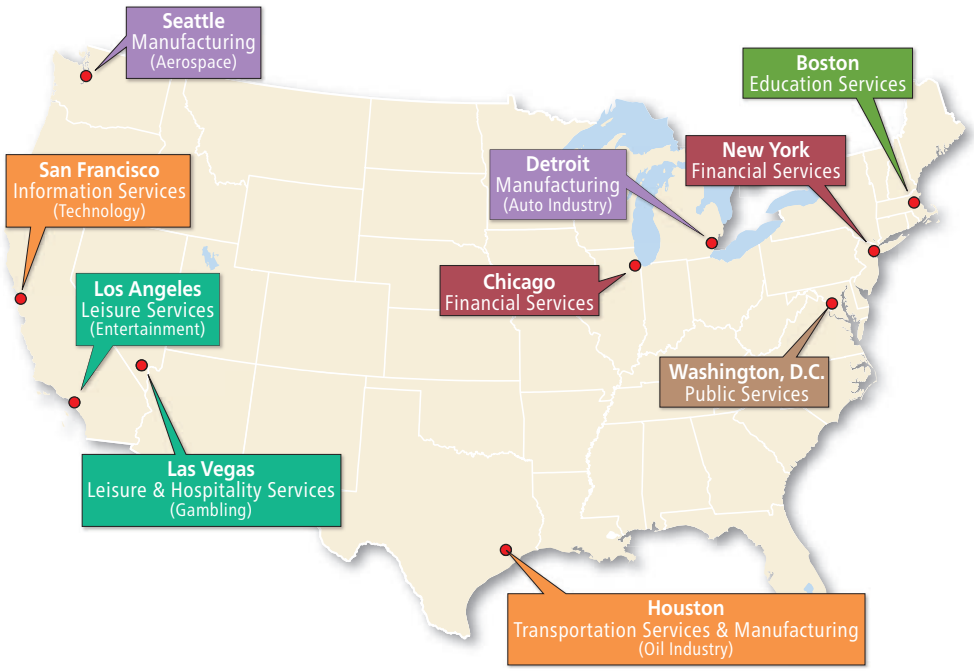
A settlement's economic base is important because exporting by the basic businesses brings more money into the local economy, thus stimulating the provision of more nonbasic services for the settlement. It works like this:

- New basic businesses attract new workers to a settlement.
- The new basic business workers bring their families with them.
- New nonbasic services are opened to meet the needs of the new workers and their families.

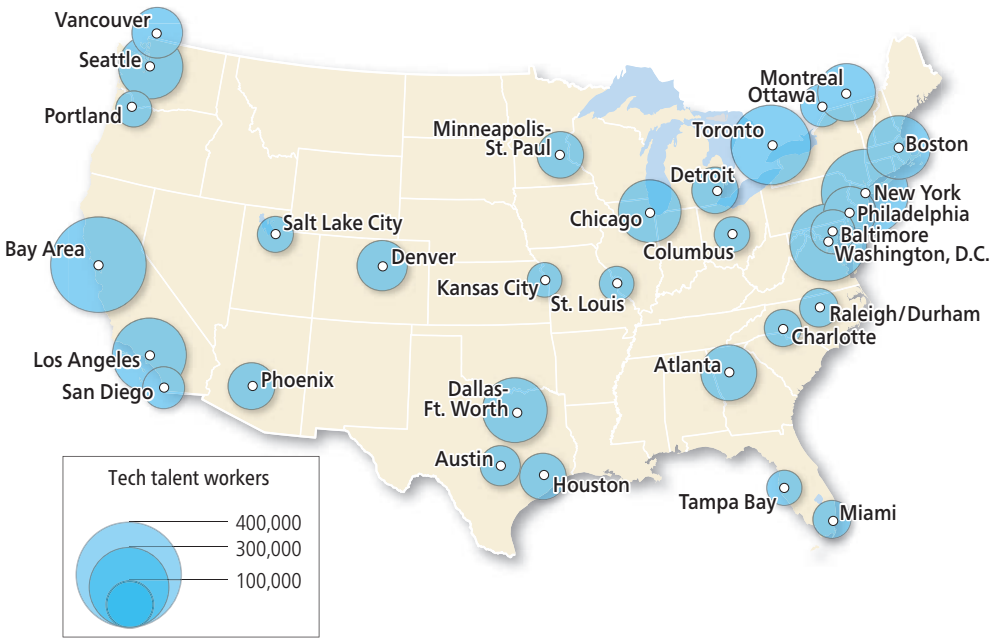
For example, when a new car assembly plant opens, new supermarkets, restaurants, and other consumer services soon follow. But the opposite doesn't occur: A new supermarket does not induce construction of a new car plant.

Settlements in the United States can be classified by their distinctive collection of basic businesses (Figure 12-30). The concept of basic businesses originally referred to manufacturing, but with the growth of the service sector of the economy, the basic businesses of many communities are in consumer, business, and public services, such as tech services (Figure 12-31).

If a settlement's basic businesses are growing, they attract other basic and nonbasic businesses that can benefit from proximity. The result can be a cluster of businesses that reinforce each other's growth. For example, San Francisco's basic sector in technology consists of a cluster of business sectors that complement each other. Conversely, if a settlement's basic businesses are shedding jobs – such as Detroit's auto industry – then other businesses in the cluster may also decline.



▲ **FIGURE 12-30 ECONOMIC BASE OF SELECTED U.S. URBAN SETTLEMENTS**

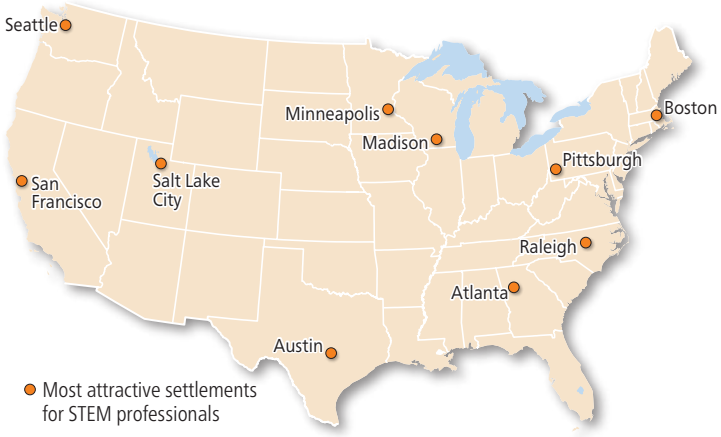


▲ **FIGURE 12-31 TECH HUBS IN NORTH AMERICA**

Distribution of Talent

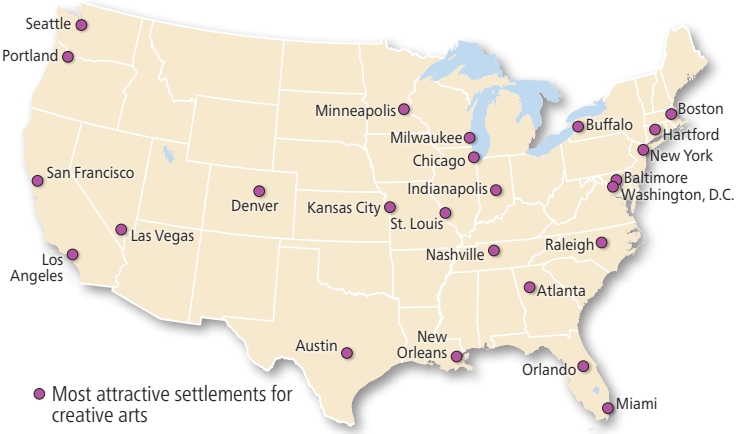
Individuals possessing special talents are not distributed uniformly among settlements. Some settlements have more than their fair share of individuals with various talents. Attracting talented individuals is important because these individuals are responsible for promoting economic innovation in a settlement. They are likely to start new businesses and infuse the settlement's economy with fresh ideas.

Settlements for Talented Scientists. For science, technology, engineering, and mathematics (STEM) professionals, the most attractive settlements are Seattle, Boston, Atlanta, Austin, and Minneapolis, according to wallethub.com (Figure 12-32). The rankings were based in part on job openings for STEM professionals as well as a judgment concerning the quality of life in a settlement that STEM professionals value.



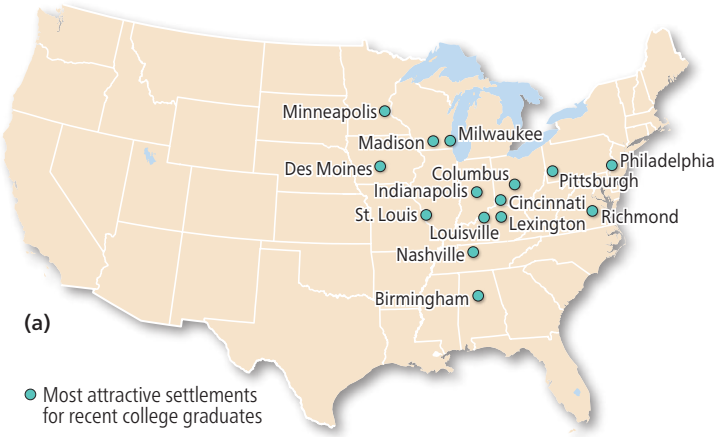
▲ **FIGURE 12-32 TEN MOST ATTRACTIVE U.S. SETTLEMENTS FOR STEM PROFESSIONALS**

Settlements for Talented Artists. The settlements most attractive for people in the creative arts differ from those for STEM professionals. New York, San Francisco, Seattle, Los Angeles, and Minneapolis were considered the most attractive in a Creative City Index assessment (Figure 12-33). The rankings were based on the numbers of creative jobs per capita, creative arts schools, performing arts companies, and jobs in the motion picture and video industries.



▲ **FIGURE 12-33 MOST ATTRACTIVE U.S. SETTLEMENTS FOR CREATIVE ARTISTS**

Settlements for Recent Graduates. For recent college graduates, the most attractive settlements in the United States are Cincinnati; Columbus, Ohio; and St. Louis, according to smartasset.com (Figure 12-34). The determination was based on several factors, including job availability (unemployment rate, job openings for college grads on Indeed.com, and earnings for college grads), affordability (cost of living and cost of rent), fun (concentration of dining and entertainment establishments and average Yelp score for bars and restaurants), and percentage of the population between 20 and 29 years old.



(b)

▲ **FIGURE 12-34 MOST ATTRACTIVE U.S. SETTLEMENTS FOR RECENT COLLEGE GRADUATES** (a) The most attractive settlement for recent college graduates, according to smartasset.com. (b) Findlay Market in Cincinnati, ranked by smartasset.com as the most attractive settlement for recent college graduates.

KEY ISSUE

12.4 | Where Are Consumer Services Distributed?

Consumer services and business services do not have the same distributions. Consumer services generally follow a regular pattern based on size of settlements, with larger settlements offering more consumer services than smaller ones.

Central Place Theory

Learning Outcome 12.4.1 Explain the concepts of market area, range, and threshold.

Selecting the right location for a new shop is probably the single most important factor in the profitability of a consumer service. **Central place theory** helps to explain how the most profitable location can be identified. Central place theory was first proposed in the 1930s by German geographer Walter Christaller, based on his studies of southern Germany. August Lösch in Germany and Brian Berry and others in the United States further developed the concept during the 1950s.

Market Area of a Service

A **central place** is a market center for the exchange of goods and services by people attracted from the surrounding area. The central place is so called because it is centrally located to maximize accessibility. Businesses in central places compete against each other to serve as markets for goods and services for the surrounding region. According to central place theory, this competition creates a regular pattern of settlements.

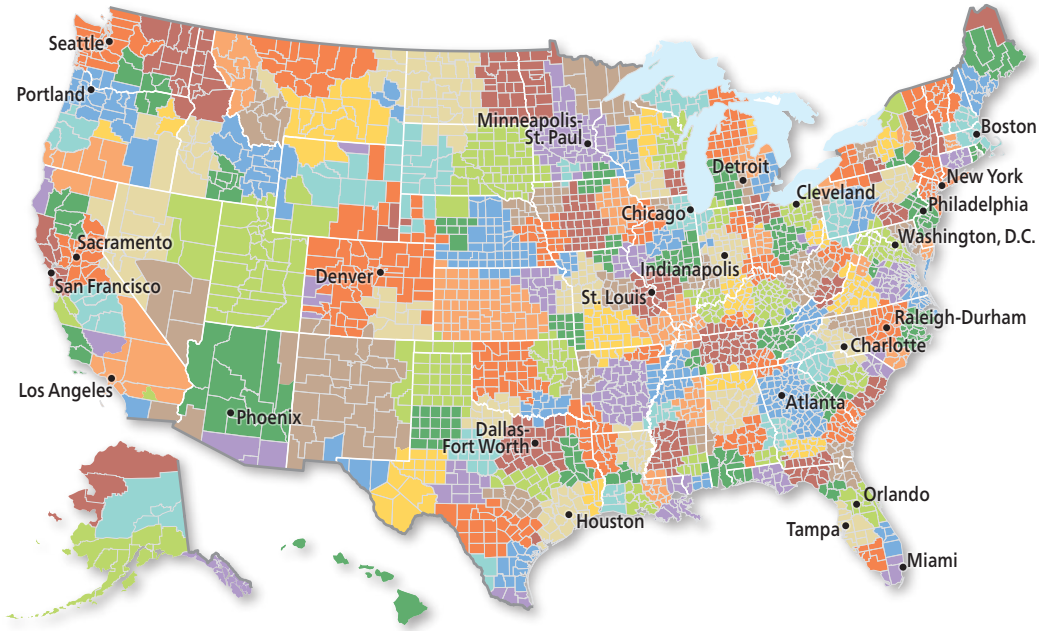
The area surrounding a service from which customers are attracted is the **market area**, or **hinterland**. A market area is a good example of a nodal region – a region with a core where the characteristic is most intense. To establish the market area, a circle is drawn around the node of service on a map. The territory inside the circle is its market area.

Because most people prefer to get services from the nearest location, consumers near the center of the circle obtain services from local establishments. The closer to the periphery of the circle, the greater the percentage of consumers who will choose to obtain services from other nodes. People on the circumference of the market-area circle are equally likely to use the service or go elsewhere.

The United States can be divided into market areas based on the hinterlands surrounding the largest urban settlements. One example is a **media market area**, which is a region where the population receives the same TV and radio station broadcasts and newspapers and consumes similar internet content (Figure 12-35). Media market areas in the United States typically form hinterlands surrounding the largest urban settlements (Figure 12-36). A generation earlier, C. A. Doxiadis, Brian Berry, and the U.S. Department of Commerce allocated the 48 contiguous states to 171 functional regions centered around commuting hubs, which they called "daily urban systems."

Pause & Reflect 12.4.1 In what media market area do you or someone you know live? How far are you from the city at the center of your media market area?

▼ **FIGURE 12-35 U.S. MEDIA MARKET AREAS** The Nielsen Corporation determines market areas based on patterns of TV, radio, newspaper, and internet coverage. The 25 largest market areas are labeled.



▼ **FIGURE 12-36 INDIANAPOLIS: THE TWENTY-FIFTH LARGEST U.S. MEDIA MARKET AREA**

Range of a Service

Each service has a distinctive market area. To determine the extent of a market area, geographers need two pieces of information about a service: its range and its threshold. How far are you willing to travel for a pizza? To see a doctor for a serious illness? To watch a ball game? The **range** is the maximum distance people are willing to travel to use a service. The range is the radius of the circle (or hexagon) drawn to delineate a service's market area.

People are willing to go only a short distance for everyday consumer services, such as groceries and pharmacies. But they will travel longer distances for other services, such as a concert or professional ball game. Thus a convenience store has a small range, whereas a stadium has a large range (Figure 12-37). In a large urban settlement, for example, the range of a fast-food franchise such as McDonald's is roughly 5 kilometers (3 miles), the range of a casual dining chain such as Steak 'n Shake is roughly 8 kilometers (5 miles), and the range of a stadium is more than 100 kilometers (60 miles).

As a rule, people tend to go to the nearest available service. For example, someone in the mood for a McDonald's hamburger is likely to go to the nearest McDonald's. Therefore, the range of a service must be determined from the radius of a circle that is irregularly shaped rather than perfectly round. The irregularly shaped circle takes in the territory for which the proposed site is closer than competitors' sites.

The range must be modified further because most people think of distance in terms of time rather than in terms of a linear measure such as kilometers or miles. If you ask people how far they are willing to travel to a restaurant or a baseball game, they are more likely to answer in minutes or hours than in distance. If the range of a good or service is expressed in travel time, then the irregularly shaped circle must be drawn to acknowledge that travel time varies with road conditions. "One hour" may translate into traveling 100 kilometers (60 miles) while driving on an expressway but only 50 kilometers (30 miles) while driving city streets.

Threshold of a Service

The second piece of geographic information needed to compute a market area is the **threshold**, which is the minimum number of people needed to support the service. Every enterprise has a minimum number of customers required to generate enough sales to make a profit. So once the range has been determined, a service provider must determine whether a location is suitable by counting the potential customers inside the irregularly shaped circle. Census data help to estimate the potential population within the circle.

How potential consumers inside the range are counted depends on the product. Convenience stores and fast-food restaurants appeal to nearly everyone, whereas other goods and services appeal primarily to certain consumer groups.

For example:

- Movie theaters generally attract younger people; chiropractors generally attract older folks.
- People of modest economic means might be drawn to thrift stores; people with ample economic means might frequent upscale department stores.
- Amusement parks largely attract families with children; nightclubs largely appeal to singles.

Developers of shopping malls, department stores, and large supermarkets may count only higher-income people, perhaps those whose annual incomes exceed $50,000. Even though the stores may attract individuals of all incomes, higher-income people are likely to spend more and purchase items that carry higher profit margins for the retailer. A large retailer has many locations to choose from when deciding to build new stores. A suitable site is one with the potential for generating enough sales to justify using the company's often times scarce capital to build a store.

Gravity Model

Geographers have adapted the gravity model from physics. In retailing geography, the gravity model measures the level of interaction between a person and a service. The **gravity model** predicts that the optimal location of a service is directly related to the number of people in the area (the threshold) and inversely related to the distance people must travel to access it (the range). The best location will be the one that minimizes the distances that all potential customers must travel to reach the service.

According to the gravity model, consumer behavior reflects two patterns:

1. The greater the number of people living in a particular place (the higher the threshold), the greater the number of potential customers for a service. A neighborhood that contains 100 families will generate more customers than an individual house containing only 1 family.
2. The farther people are from a particular service (the higher the range), the less likely they are to use it. People who live 1 kilometer (.6 miles) from a store are more likely to patronize it than people who live 10 kilometers (6 miles) away.

At some point, interaction between a person and a service does not occur because the distance between them is too great.

FIGURE 12-37 INDIANAPOLIS: LUCAS OIL STADIUM

Market Area Analysis

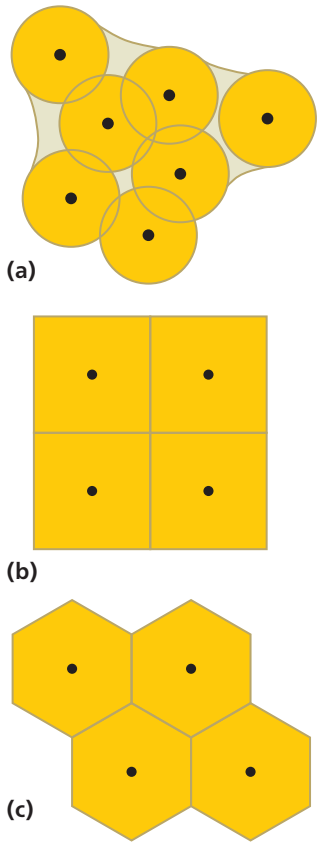
Learning Outcome 12.4.2 Explain how to use threshold and range to find the optimal location for a service.

The best location for a factory is typically described as a large region, such as auto alley. For service providers, the optimal location is much more precise: One corner of an intersection can be profitable and another corner of the same intersection unprofitable.

The Geometry of Market Areas

To represent market areas in central place theory, geographers draw hexagons around settlements. According to central place theory, market areas across a developed country would be a series of hexagons of various sizes, unless interrupted by physical features such as mountains and bodies of water (Figure 12-38). The market area is the area of the hexagon, the range is the radius, and the threshold is a sufficient number of people inside the area to support the services. Hexagons represent a compromise between circles and squares (Figure 12-39).

Four different levels of market area – hamlet, village, town, and city – are shown in Figure 12-40. Overlapping hexagons of different sizes form a nesting pattern. Hamlets with very small market areas are represented by the smallest contiguous hexagons. Larger hexagons represent the market areas of larger settlements and are overlaid on the smaller hexagons because consumers from smaller settlements shop for some goods and services in larger settlements. Developed countries have numerous small settlements with small thresholds and ranges and far fewer large settlements with large thresholds and ranges. In his original study, Walter Christaller showed that the distances between settlements in southern Germany followed a regular pattern.

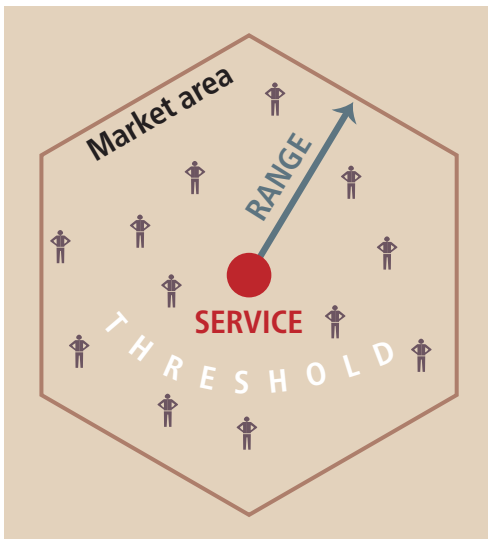


▲ **FIGURE 12-39 WHY GEOGRAPHERS USE HEXAGONS TO DELINEATE MARKET AREAS**

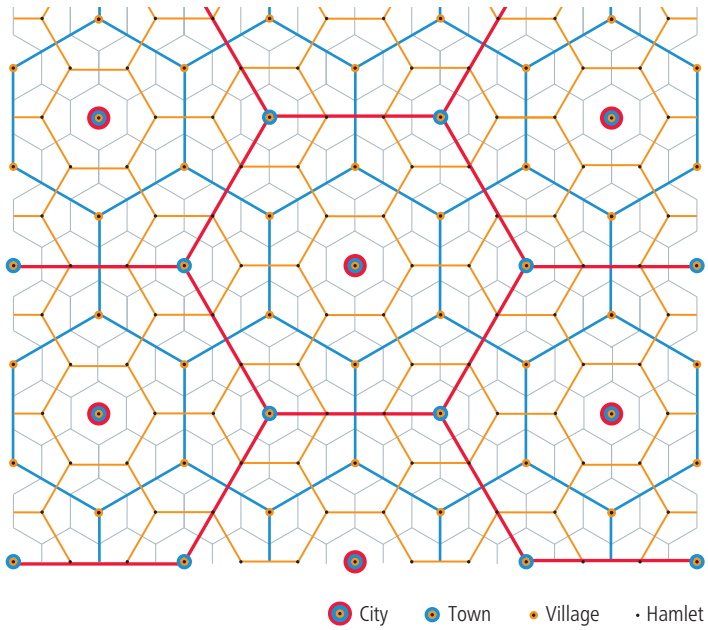
(a) THE PROBLEM WITH CIRCLES Circles are equidistant from center to edge, but they overlap or leave gaps. An arrangement of circles that leaves gaps indicates that people living in the gaps are outside the market area of any service, which is obviously not true. Overlapping circles are also unsatisfactory in determining market area for competing services because one service or another will be closer, and people will tend to patronize it.

(b) THE PROBLEM WITH SQUARES Squares nest together without gaps, but their sides are not equidistant from the center. If the market area is a circle, the radius—the distance from the center to the edge—can be measured because every point around a circle is the same distance from the center. However, in a square, the distance from the center varies among points along a square.

(c) THE HEXAGON COMPROMISE Geographers use hexagons to depict the market area of a service because hexagons offer a compromise between the geometric properties of circles and squares. Like squares, hexagons nest without gaps. Although all points along the hexagon are not the same distance from the center, the variation is less than with a square.



▲ **FIGURE 12-38 MARKET AREA, RANGE, AND THRESHOLD DEPICTED AS A HEXAGON**



▲ **FIGURE 12-40 CENTRAL PLACE THEORY**

Regular Pattern of Settlements & Services

Businesses in central places compete against each other to serve as markets for goods and services for the surrounding region. People spend as little time and effort as possible in obtaining consumer services and thus go to the nearest place that fulfills their needs. We travel greater distances only if the price is much lower or if the item is unavailable locally.

According to central place theory, this competition creates a regular pattern of settlements. Across much of the interior of the United States, a regular pattern of settlements can be observed, even if not precisely the same as the generalized model shown in Figure 12-40. North-central North Dakota is an example (Figure 12-41). Minot – the largest city in the area, with 48,000 inhabitants – is surrounded by:

- 13 small towns of between 1,000 and 3,000 inhabitants, with average ranges of 30 kilometers (20 miles) and market areas of around 2,800 square kilometers (1,100 square miles).
- 29 villages of between 100 and 999 inhabitants, with ranges of 20 kilometers (12 miles) and market areas of around 1,200 square kilometers (500 square miles).
- 34 hamlets of fewer than 100 inhabitants, with ranges of 15 kilometers (10 miles) and market areas of around 800 square kilometers (300 square miles).

Larger settlements provide consumer services that have larger thresholds, ranges, and market areas. Only consumer services that have small thresholds, short ranges, and small market areas are found in small settlements because too few people live in small settlements to support many services. A large store cannot survive in a small settlement because the threshold (the minimum number of people needed) exceeds the population within range of the settlement. For example, Minot is the only settlement in Figure 12-41 that has a Target.

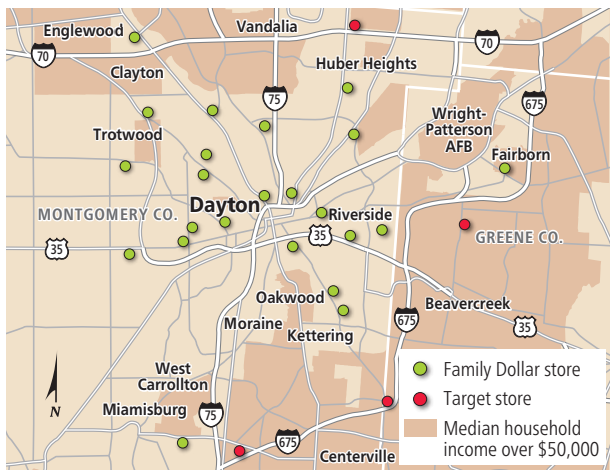
▲ **FIGURE 12-41 CENTRAL PLACE THEORY IN NORTH DAKOTA** Central place theory helps explain the distribution of settlements of varying sizes in North Dakota.

Profitability of a Location

Major U.S. consumer services, such as supermarkets and department stores, employ geographers to determine the best location to build new stores. Geographers use the two components of central place theory – range and threshold – to determine whether a location would be profitable and, conversely, where it would not be profitable. Here's how:

1. **Define the market area.** The first step is to define the market or trade area where the store would derive most of its sales. The market area is often defined as the ZIP codes where two-thirds to three-fourths of the customers live.
2. **Estimate the range.** Based on the ZIP codes of credit-card customers, geographers can estimate the range for the service (Figure 12-42). The range is around 15 minutes for a store like Family Dollar and 30 minutes for a store like Target.
3. **Estimate the threshold.** The threshold varies for each service. The threshold is around 25,000 potential customers for a store like Family Dollar and 100,000 for a store like Target. People are counted only if they have sufficient income to shop regularly at the store.
4. **Predict the market share.** The new consumer service will have to share customers with competitors. Geographers typically predict market share through the so-called analog method. The geographer identifies one or more existing stores in locations judged to be comparable to the location of the proposed store. The geographer then applies the market share of the comparable stores to the proposed new store.

Pause & Reflect 12.4.2 In Figure 12-42, why is the number of Target stores in the Dayton area lower than that of the Family Dollar stores?



▲ **FIGURE 12-42 RETAILERS IN DAYTON, OHIO** Compared with Target, Family Dollar has a lower threshold and lower range. Target stores are more likely to be located in higher income areas than are Family Dollar stores.

Hierarchy of Consumer Services

Learning Outcome 12.4.3 Explain the rank-size and primate city rules.

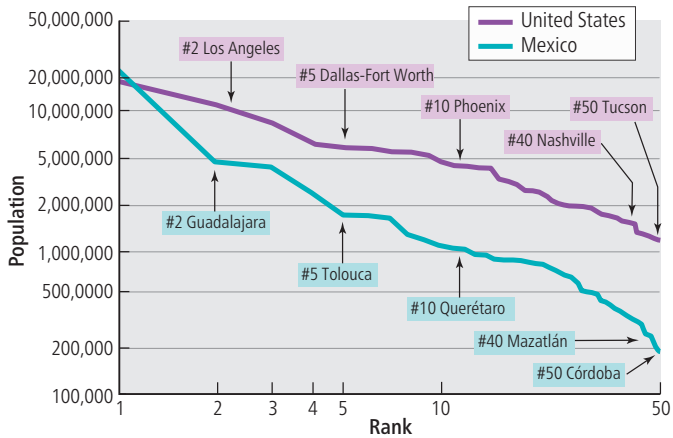
Geographers observe that for the United States ranking settlements from largest to smallest population produces a straight line on a graph with a logarithmic scale. In other countries, the ranking does not produce a linear pattern.

Rank-Size Distribution of Settlements

The **rank-size rule** states that a country's *n*th-largest settlement will be 1/*n* the population of the largest settlement. According to the rank-size rule, the second-largest city is one-half the size of the largest, the fourth-largest city is one-fourth the size of the largest, and so on. When plotted on logarithmic paper, the rank-size distribution forms a fairly straight line.

In the United States and some other developed countries, such as Canada and Australia, the distribution of settlements follows the rank-size rule at least reasonably closely. The rank-size rule is not followed in many developing countries, including Mexico. The largest settlement in Mexico (Mexico City) has approximately the same population as the largest settlement in the United States (New York). But the second-largest settlement in Mexico, Guadalajara, is much smaller than the second-largest settlement in the United States, Los Angeles (Figure 12-43).

In many countries, the distribution of settlements follows the **primate city rule**, in which the largest settlement has more than twice as many people as the second-ranking settlement. In this distribution, the country's largest city is called the **primate city**. Mexico is an example of a country that follows the primate city distribution. Its largest settlement, Mexico City, is 10 times larger than its 5th-largest settlement, Toluca, rather than 5 times larger.



▲ **FIGURE 12-43 RANK-SIZE DISTRIBUTION OF SETTLEMENTS IN THE UNITED STATES AND MEXICO** The size of settlements (as measured by metropolitan area population) follows the rank-size rule in the United States and the primate city rule in Mexico.

▲ **FIGURE 12-44 RANK-SIZE DISTRIBUTION: UNITED STATES** Nashville is the 40th largest settlement in the United States and has a larger population than the rank-size rule predicts.

The difference between the fortieth-largest settlements of Mexico (Mazatlán) and the United States (Nashville) is visible in the downtown areas. Nashville, which has a metropolitan area population of around 2,000,000, has a downtown area filled with high-rise buildings occupied by service providers (Figure 12-44). Mazatlán, with a metropolitan area population of 455,000, has a much more modest downtown (Figure 12-45).

The existence of a rank-size distribution of settlements is not merely a mathematical curiosity. It has a real impact on the quality of life for a country's inhabitants. A regular hierarchy – as in the United States – indicates that the society is sufficiently wealthy to justify the provision of goods and services to consumers throughout the country. Conversely, the absence of the rank-size distribution in a developing country indicates that there is not enough wealth in the society to pay for a full variety of services. The absence of a rank-size distribution constitutes a hardship for people who must travel long distances to reach an urban settlement with shops, hospitals, and other important services.

▲ **FIGURE 12-45 PRIMATE CITY DISTRIBUTION: MEXICO** Mazatlán is Mexico's 40th largest settlement but has a smaller population than the rank-size rule would suggest.

Periodic Markets

Not all consumer services are provided in buildings in fixed locations. In both developing and developed countries, some groceries are sold in periodic markets. Services at the lower end of the central place hierarchy may be provided at a **periodic market**. A periodic market is a collection of individual vendors who come together to offer goods and services in a location on specified days. It is typically set up in a street or other public space early in the morning, taken down at the end of the day, and set up in another location the next day.

A periodic market provides goods to residents of developing countries where sparse populations and low incomes produce purchasing power too low to support full-time retailing (Figure 12-46). A periodic market makes services available in more villages than would otherwise be possible, at least on a part-time basis. In urban areas, periodic markets offer residents fresh food brought in that morning from the countryside.

▲ **FIGURE 12-46 PERIODIC MARKET, WEEKLY PERIODIC MARKET, OUAGADOUGOU, BURKINA FASO**

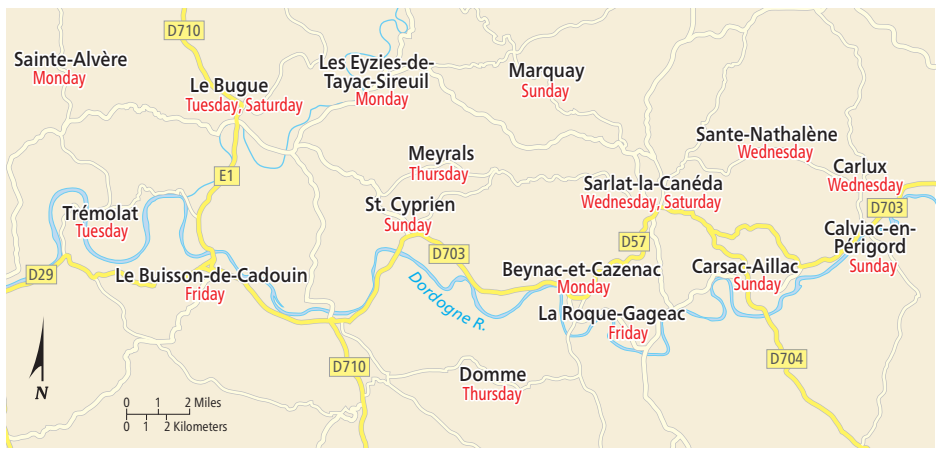
Many of the vendors in periodic markets are mobile, driving their trucks from farm to market, back to the farm to restock, then to another market. Other vendors, especially local residents who cannot or prefer not to travel to other villages, operate on a part-time basis, perhaps only a few times a year. Other part-time vendors are individuals who are capable of producing only a small quantity of food or handicrafts.

A farmers market is a form of periodic market found in many developed countries (Figure 12-47). Farmers appear at a specified time and place to sell fresh produce from farms in the surrounding region to consumers living in urban areas.

▲ **FIGURE 12-47 FARMERS MARKET, SARLAT-LA-CANÉDA, DORDOGNE, FRANCE**

The frequency of periodic markets varies by culture. In the United States, a farmers market typically sets up once or twice a week, perhaps Wednesdays and Saturdays. In rural areas of Europe, the same farmers might go from town to town through the week; they all appear in town A on Mondays, town B on Tuesdays, town C on Wednesdays, and so forth (Figure 12-48).

The once-or-twice-a-week pattern may also occur in some developing countries. In other cases, the periodic markets may follow a different pattern, related to the lunar cycle.



▲ **FIGURE 12-48 PERIODIC MARKETS, DORDOGNE, FRANCE** Sixteen small towns within 30 kilometers (20 miles) of each other have periodic markets.

Pause & Reflect 12.4.3 What are the advantages and the challenges of buying food at a periodic market?

E-commerce & Sharing Services

Learning Outcome 12.4.4 Apply geographic principles to new forms of services.

E-commerce and sharing services account for rapidly increasing shares of consumer services. Geographic principles underlying the location of consumer services help explain spatial patterns of these new forms of services.

E-commerce

At the height of the COVID-19 pandemic, when many in-person consumer services were closed, some shoppers found that e-commerce was the principal means of obtaining consumer services. In the United States, Amazon is the dominant e-commerce provider of retail services. Instead of going to stores, consumers order products online for delivery to their homes.

The distribution system established by Amazon in the United States relies for the most part on central place theory. Amazon's geography has three main elements: procurement & fulfillment, distribution, and last mile.

Procurement & Fulfillment. Amazon operated 264 fulfillment centers as of 2022 (Figure 12-49). These are very large buildings where the various products ordered by an individual are assembled for shipment. For the most part, the fulfillment centers are located in more densely populated areas of the United States.

In terms of the central place theory, these fulfillment centers have large market areas, offering products with very large ranges and very large thresholds. Some fulfillment centers fill orders that fit in a small box, whereas others fill orders that require a large box. Other fulfillment centers specialize in specific products, such as perishables like groceries or items like appliances too large to box.

Distribution. The second stage is the distribution of parceled orders toward facilities near the final delivery point. Amazon operates its own airline to move goods into fulfillment centers and out to consumers. Amazon Air had landing rights at 50 airports as of 2022 (Figure 12-50). Most fulfillment centers are located near an airport served by Amazon Air.

Last Mile. The third stage, known as the last mile, brings parcels to their final destination, mainly through delivery routes from specialized facilities. Parcel hubs arrange packages arriving from various fulfillment centers according to their regional destinations. Sorting centers sort packages by local destinations, such as by ZIP code. Packages are then sent to local post offices or other mailing services for delivery to the customer (Figure 12-51).

FIGURE 12-49 E-COMMERCE: AMAZON FULFILLMENT CENTERS

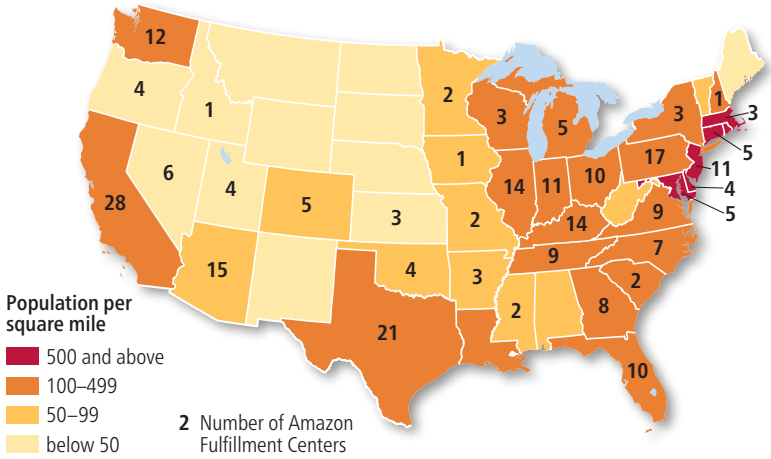


FIGURE 12-50 E-COMMERCE: AIRPORTS SERVED BY AMAZON

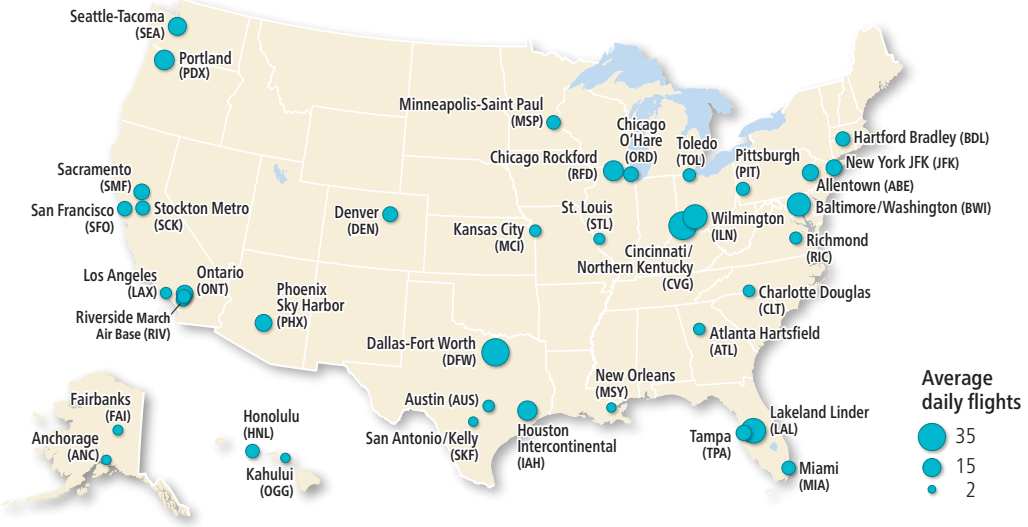


FIGURE 12-51 E-COMMERCE: AMAZON LAST MILE DELIVERY
New York City.

House Sharing

Services that involve sharing have expanded rapidly, especially in transportation and lodging. These sharing services are challenging the traditional classification of services between consumer and business.

Airbnb started in 2007 in San Francisco to provide short-term visitors with an alternative to hotels. The alternatives can be an entire house or apartment or a room in an owner-occupied house. Airbnb house sharing is especially popular among people in their 20s, who make up one-third of Airbnb customers.

In 2022, Airbnb had 12.7 million listings in more than 100,000 cities, primarily in Europe and North America (Figure 12-52). Tokyo, New York, and Paris have the largest number of listings. Airbnb has had an especially strong presence in Florida. Five of the seven cities with the most Airbnb listings per capita are in Florida (Figure 12-53).

From the perspective of the owners of the housing and the people who stay there, Airbnb operates as a consumer service. However, the corporation Airbnb, Inc., operates as a business service, and most of its employees are computer operators. The owners of the housing pay Airbnb a service fee for the ability to list the property. Airbnb has no responsibility for the cleaning and management of the housing units.

Airbnb provides travelers with a wider variety of accommodations than are available from hotels and typically at a lower cost. However, the conversion of a large number of housing units to Airbnb usage has had negative impacts on some communities. Units are sometimes rented to host large noisy parties, a practice that is especially disruptive for neighbors.

Of greater concern in many cities is the loss of affordable rental units for people with limited incomes. Property owners can make more money with short-term rentals through Airbnb than with long-term residents on annual leases. As a result, some cities attempt to limit the use of Airbnb. For example, an apartment in Paris can be used legally by Airbnb for only 120 days of the year.

Ridesharing

Ridesharing services, such as Uber and Lyft, match people looking for a ride with people who are willing for a fee to use their own cars to transport the ride seeker. Most ridesharing services compete with taxis that are company- or independent-contractor-owned cars typically summoned for hire through a phone call or a hit-or-miss process of flagging one down on the street. In contrast, ridesharing services are summoned by using a smartphone app. The driver's smartphone shows the passenger's current location and desired destination as well as the optimal route. It also confirms that the passenger has already paid for the ride.

Uber claims that its four million drivers are independent contractors, essentially one-person businesses providing a transportation business service. Some government regulators have ruled that ridesharing drivers should instead be classified as employees. The classification matters because it is the ridesharing company's responsibility to screen, train, and insure them if they are consumer service employees but not if they are independent business service contractors. Taxi drivers claim that ridesharing services are unfair competitors because they are not subject to the same regulations as taxis (Figure 12-54).

FIGURE 12-52 AIRBNB NIGHTS RENTED BY REGION, 2021

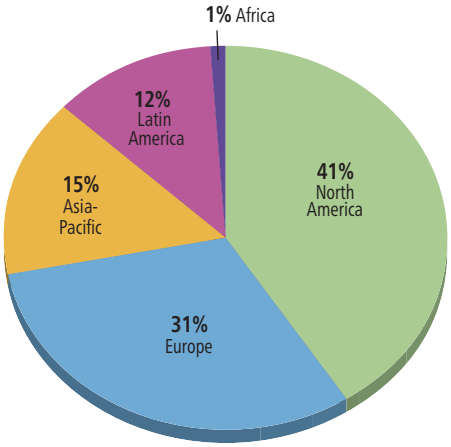


FIGURE 12-53 AIRBNB TOP 30 U.S. CITIES LISTINGS PER CAPITA

FIGURE 12-54 TAXI DRIVERS PROTEST UBER, GDANSK, POLAND

12 Summary & Review

KEY ISSUE

12.1 | Where Are Settlements & Services Distributed?

- Settlements can be rural or urban. They are home to most of the world's population.
- Developed countries have higher percentages of urban residents, whereas developing countries have most of the megacities and metacities.
- Settlements are service centers; three types of services are consumer, business, and public.

KEY ISSUE

12.2 | Why Do Services Cluster in Settlements?

- Rural settlements, which specialize in agricultural services, may be dispersed or clustered.
- Urban settlements were established in ancient times as service centers.

KEY ISSUE

12.3 | Where Are Business Services Distributed?

- Business services cluster in global cities.
- Developing countries provide offshore financial services and business-process outsourcing.
- Communities specialize in the provision of particular services; the specialized services constitute a community's economic base.

KEY ISSUE

12.4 | Where Are Consumer Services Distributed?

- A central place is surrounded by a market area that has a range and a threshold.
- Market areas of varying sizes nest and overlap.
- Regular patterns of settlements that provide consumer services can be observed, especially in developed countries.

Thinking Geographically

KEY ISSUE

12.1 | Where Are Settlements & Services Distributed?

An initiative called "Tulsa Remote" is offering $10,000 to tech workers who work from home to relocate to Oklahoma. Compared with a megacity, what advantages might be offered by a small settlement like Tulsa?

▲ **FIGURE 12CR-1 TULSA REMOTE** Jaleesa Garland, a marketing manager at an e-commerce startup who works from home, moved to Tulsa from California at the beginning of the COVID-19 pandemic.

KEY ISSUE

12.2 | Why Do Services Cluster in Settlements?

Memphis, Egypt, was the world's largest settlement 5,000 years ago. The largest structure in Memphis was a pyramid (refer to Figures 12-18 and 12-19). Based on our understanding of services in early settlements, what do you expect to be the purpose of the settlement's most prominent structure?

▲ **FIGURE 12CR-2 MEMPHIS, EGYPT**

KEY ISSUE

12.3 | Where Are Business Services Distributed?

Liechtenstein is a developed country in the heart of Europe that is an offshore financial service center (refer to Figure 12-26). What advantages might Liechtenstein's location in Europe offer as an offshore financial service center?

▲ **FIGURE 12CR-3 NATIONAL BANK OF LIECHTENSTEIN**

KEY ISSUE

12.4 | Where Are Consumer Services Distributed?

What consumer services are lacking in your community that you would like to see added? How might the concepts of range and threshold help explain their absence from or possible addition to your community?

▲ **FIGURE 12CR-4 CONSUMER SERVICE: TARGET STORE**

Key Terms

Basic business A business that sells its products or services primarily to consumers outside the settlement.

Business service A service that primarily meets the needs of other businesses, including professional, financial, and transportation services.

Central place A market center for the exchange of services by people attracted from the surrounding area.

Central place theory A theory that explains the distribution of services based on the fact that settlements serve as centers of market areas for services; larger settlements are fewer and farther apart than smaller settlements and provide services for a larger number of people who are willing to travel farther.

Clustered rural settlement A rural settlement in which the houses and farm buildings of each family are situated close to each other, with fields surrounding the settlement.

Consumer service A business that provides services primarily to individual consumers, including retail services and education, health, and leisure services.

Dispersed rural settlement A rural settlement pattern characterized by isolated farms rather than clustered villages.

Economic base A community's collection of basic businesses.

Enclosure movement The process of consolidating small landholdings into a smaller number of larger farms in England during the eighteenth century.

Global city A major center for the provision of services in the global economy.

Gravity model A model that holds that the potential use of a service at a particular location is directly related to the number of people in a location and inversely related to the distance people must travel to reach the service.

Market area (or **hinterland)** The area surrounding a central place from which people are attracted to use the place's goods and services.

Media market area An area where the population receives the same TV and radio station broadcasts and newspapers and consumes similar internet content.

Megacity An urban settlement with a total population in excess of 10 million people.

Metacity An urban settlement with a total population in excess of 20 million people.

Nonbasic business A business that sells its products primarily to consumers in the community where the business is located.

Periodic market A collection of individual vendors who come together to offer goods and services in a location on specified days.

Primate city The largest settlement in a country, if it has more than twice as many people as the second-ranking settlement.

Primate city rule A pattern of settlements in a country such that the largest settlement has more than twice as many people as the second-ranking settlement.

Public service A service offered by the government to provide security and protection for citizens and businesses.

Range (of a service) The maximum distance people are willing to travel to use a service.

Rank-size rule A pattern of settlements in a country such that the nth largest settlement is 1/n the population of the largest settlement.

Rural settlement A community where most people are engaged in agriculture.

Service Any activity that fulfills a human want or need and returns money to those who provide it.

Settlement A permanent collection of buildings and inhabitants.

Social heterogeneity People from varied racial, ethnic, and national backgrounds and with diverse lifestyle preferences.

Threshold The minimum number of people needed to support a service.

Urban settlement A community where people are employed in secondary- and tertiary-sector jobs.

Urbanization An increase in the percentage and in the number of people living in urban settlements.

International Geographic Mapping Explorations

New England Clustered Settlement

Clustered rural settlements in New England were typically arranged around a central common or public open space. Newfane's common is divided by roads into three sections—a small triangular section to the west, a larger triangular section in the middle, and a semicircular section to the east.

FIGURE 12CR-5 NEWFANE, VERMONT

. . . . Most people in the world live in an urban settlement, where most jobs are in services. Geographers observe regularities in the distribution of settlements based on their distinctive business, consumer, and public services. Geographers also find that within an individual settlement, different groups of people tend to live in particular places, as we will see in the next chapter, Urban Patterns. . . .

13 Urban Patterns

KEY ISSUES

13.1 Why Are Urban Settlements Challenging to Define?

Geographers have constructed various definitions to portray the growth and extent of cities. Services, especially business and public services, cluster downtown, known more precisely as the central business district.

13.2 Where Are People Distributed Within the Cities of Developed Countries?

Several models have been created to describe where different people tend to cluster within urban areas in the United States and in other cities elsewhere in the world.

13.3 Where Are People Distributed Within the Cities of Developing Countries?

The models of internal structure can be applied to cities in developing countries, but the patterns vary from those typically found in North American cities.

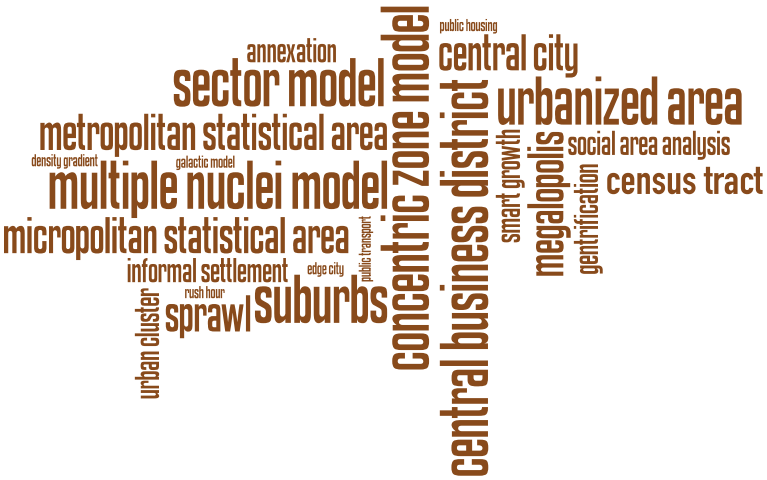
13.4 Why Might Urban Settlements Be More Sustainable?

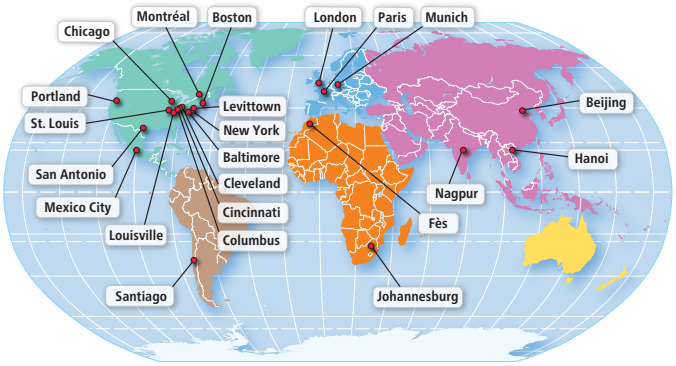
The rapid growth of cities has relied on evolving forms of transportation. Within cities are contrasts between areas of prosperity and areas of hardship.

▶ Sitabuldi market, Nagpur, India.

A large city is stimulating and agitating, entertaining and frightening, welcoming and cold. A city has something for everyone, but a lot of those things are for people who are different from you. Urban geography helps to sort out the complexities of familiar and unfamiliar patterns in urban areas.

LOCATIONS EXPLORED IN THIS CHAPTER





KEY ISSUE

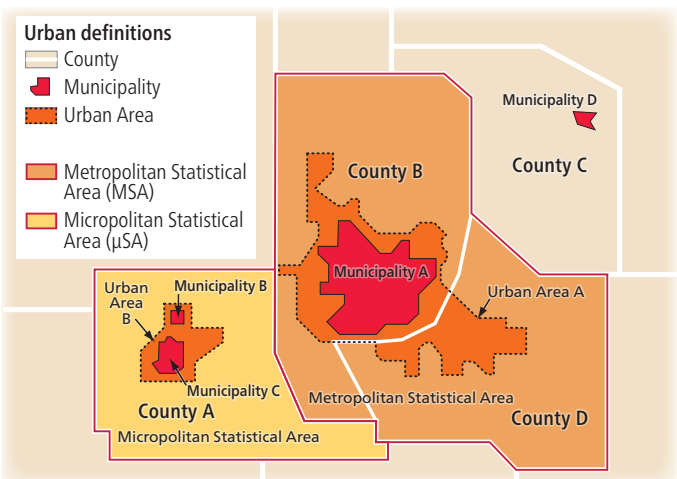
13.1 | Why Are Urban Settlements Challenging to Define?

When you are staring at the Empire State Building in New York City, you know you are in a city. When you are standing in a cornfield in Iowa, you have no doubt that you are in the country. Geographers help explain why urban and rural settlements are different. Chapter 12 and this chapter are both concerned with urban geography, but at different scales. Chapter 12 examined the distribution of urban settlements at national and global scales. This chapter looks at where people and activities are distributed within urban areas.

Defining Urban Settlements

Learning Outcome 13.1.1 Compare various definitions of urban settlements.

Historically, urban settlements were very small and compact. As these settlements have grown, definitions have been created to characterize their different parts. Figure 13-1 illustrates several ways that urban settlements are defined in the United States.



▲ **FIGURE 13-1 DEFINITIONS OF URBAN SETTLEMENTS** The Office of Management and Budget definitions can be applied to this illustration:

- Municipality A: inside County B.
- Municipalities B and C: inside County A.
- Urban Area A: inside Counties B and D surrounding Municipality A.
- Urban Area B: inside County A surrounding Municipalities B and C.
- Metropolitan statistical area (MSA): Counties B and D.
- Micropolitan statistical area (µSA): County A.

Municipality. A **municipality** (also known as an **incorporated place**, a **central city**, or simply a city) is an urban settlement that has been legally incorporated into an independent, self-governing unit known as a municipality. Virtually all countries have a local government system that recognizes cities as legal entities with fixed boundaries. A city has locally elected officials, the ability to raise taxes, and responsibility for providing essential services. The boundaries of the city define the geographic area within which the local government has legal authority. In the United States, population has been declining in most central cities in the North and East.

Urban Area. An **urban area** consists of a central city and its surrounding built-up suburbs. As of the 2020 census, an area qualifies as urban if it has a population of at least 5,000 or it contains at least 2,000 housing units. The census identified 2,613 urban areas in the United States as of 2020. All of the urban areas combined comprised less than 3 percent of the land area of the United States, whereas approximately 80 percent of the U.S. population lived in one of the urban areas.

In previous decades, the U.S. Census Bureau distinguished between an **urbanized area** (an urban area with a population of at least 50,000 inhabitants) and an **urban cluster** (an urban area with between 5,000 and 50,000 inhabitants). The census identified 486 urbanized areas and 3,087 urban clusters in the United States as of 2010. The census no longer distinguishes between urbanized areas and urban clusters.

Metropolitan Area. To reflect the extensive area of economic and cultural influence of settlements, the Office of Management and Budget (OMB) designates metropolitan areas in the United States. The OMB uses census data to identify two types of metropolitan areas: a metropolitan statistical area (MSA) and a micropolitan statistical area (µSA).

A **metropolitan statistical areas (MSA)** includes an urban area of at least 50,000 inhabitants, the county within which the central city is located, and adjacent counties with a high population density and a large percentage of residents working in the county containing the central city. MSAs are widely used in studies of urban settlements because many statistics are published for counties, the basic building block for MSAs in most states. (In New England, towns are sometimes used instead of counties.) OMB designated 392 MSAs (including 8 in Puerto Rico) as of 2020. MSAs encompass 86 percent of the U.S. population.

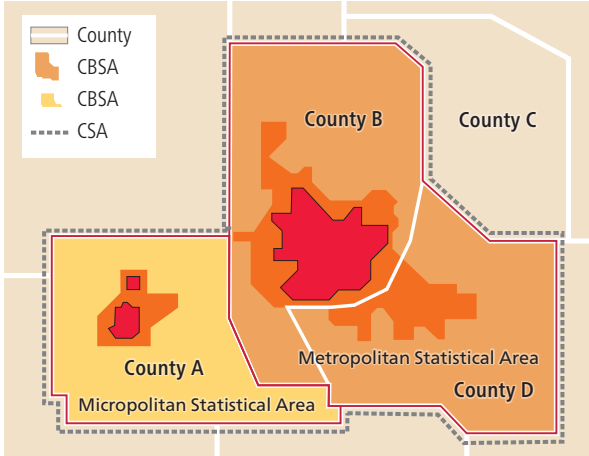
A **micropolitan statistical area (µSA)** includes an urban area of between 10,000 and 50,000 inhabitants, the county in which the urban area is located, and adjacent counties tied to the urban area. The United States had 543 µSAs as of 2020, for the most part found around southern and western communities previously considered rural in character. About 8 percent of Americans live in a µSA.

Overlapping Metropolitan Areas

Because adjacent metropolitan areas often overlap, OMB combines MSAs and µSAs in several ways:

- A **core-based statistical area (CBSA)** is any one MSA or µSA (935 as of 2020, including the 392 MSAs and the 543 µSAs).
- A **combined statistical area (CSA)** is two or more contiguous CBSAs tied together by commuting patterns. OMB designated 176 CSAs as of 2020.

Figure 13-2 includes two CBSAs (the MSA consisting of Counties B and D and the µSA consisting of County A) and one CSA (Counties A, B, and D).



▲ **FIGURE 13-2 EXAMPLE OF CBSA AND CSA** The example includes two CBSAs (the MSA consisting of Counties B and D and the µSA consisting of County A) and one CSA (Counties A, B, and D).

Megalopolis

A **megalopolis** is a collection of adjacent or overlapping metropolitan areas that merge into a continuous urban region. The word *megalopolis* is derived from the Greek meaning "great city." Geographer Jean Gottmann applied the term *Megalopolis* (with a capital M) specifically to a continuous urban complex in the northeastern United States that extends from north of Boston to south of Washington, D.C. (Figure 13-3).

Other urban complexes exist in the United States, including the southern Great Lakes between Milwaukee and Pittsburgh and southern California between Los Angeles and Tijuana. Among important examples in other developed regions are the German Ruhr (including the cities of Dortmund, Düsseldorf, and Essen), Randstad in the Netherlands (including the cities of Amsterdam, The Hague, and Rotterdam), and Japan's Tokaido (including the cities of Tokyo and Yokohama).

Within Megalopolis, the downtown areas of individual cities such as Baltimore, New York, and Philadelphia retain distinctive identities, and the urban areas are visibly separated from each other by open space used as parks, military bases, and farms. But at the periphery of the urban areas, the boundaries overlap.

▲ **FIGURE 13-3 MEGALOPOLIS** Also known as the Boswash corridor, Megalopolis extends more than 700 kilometers (440 miles) between north of Boston and south of Washington. Megalopolis contains one-sixth of the U.S. population on less than 1 percent of the country's total land area. The red lines show boundaries between MSAs and µSAs, and the white lines show boundaries between counties within a single area.

Pause & Reflect 13.1.1

Do you live inside or outside a central city? An urban area? A metropolitan area?

Origin & Growth of Suburbs

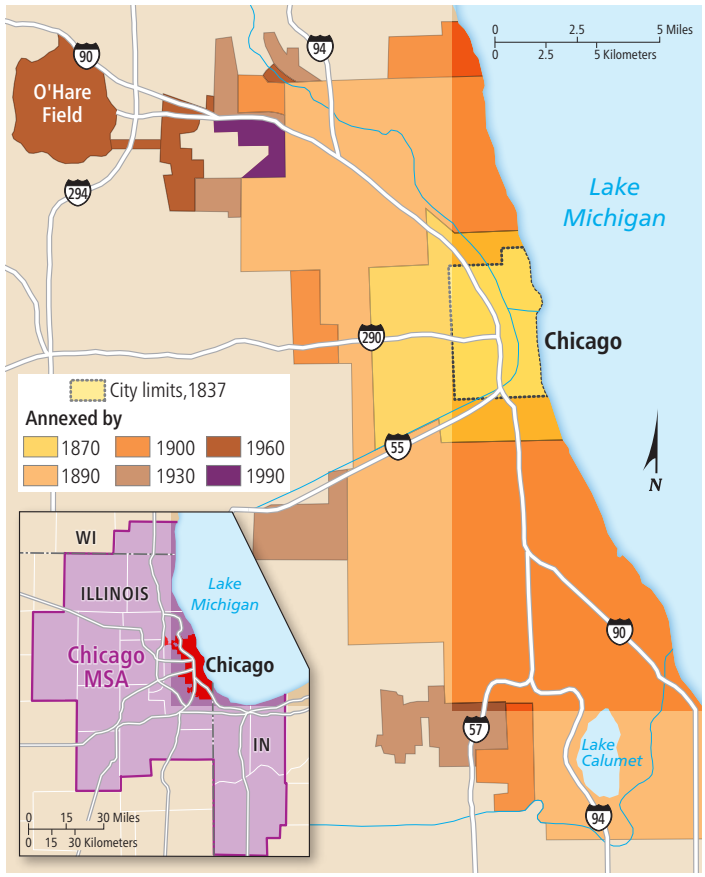
Learning Outcome 13.1.2 Explain the process of suburban growth.

A **suburb** is a residential or commercial area situated within an urban area but outside the central city. Since ancient times, residential areas were built outside cities. When cities were surrounded by walls and ran out of room for more housing, new residential areas were built beyond the walls. When cities grew rapidly during the nineteenth century as part of the Industrial Revolution, more extensive residential areas appeared.

Around 55 percent of Americans currently live in suburbs compared to 25 percent in cities and 20 percent in small towns and rural areas. In 1950, only 20 percent of Americans lived in suburbs whereas 40 percent lived in cities and 40 percent lived in small towns and rural areas. The percentage living in suburbs has climbed rapidly, beginning with the years immediately after World War II, when returning GIs married, had several children (the baby boomer generation), and needed decent housing (Figure 13-4).

Annexation

As cities grew in the United States, they expanded by adding peripheral land. The process of legally adding land area to a city is **annexation**. Rules concerning annexation vary among states. Normally, land can be annexed to a city only if a majority of residents in the affected area vote in favor of the annexation.



▲ **FIGURE 13-5 ANNEXATION IN CHICAGO**

Peripheral residents generally desired annexation in the nineteenth century because the city offered better services, such as water supply, sewage disposal, trash pickup, paved streets, public transportation, and police and fire protection. Thus, as U.S. cities grew rapidly in the nineteenth century, the legal boundaries frequently changed to accommodate newly developed areas. For example, the city of Chicago expanded from 26 square kilometers (10 square miles) in 1837 to 492 square kilometers (190 square miles) in 1900 (Figure 13-5).

In contrast, in recent decades cities have been less likely to annex peripheral land because the residents of the peripheral land have preferred to organize their own services rather than pay city taxes for them. Now, cities are surrounded by a collection of suburban jurisdictions whose residents prefer to remain legally independent of the large city. Originally, some of these peripheral jurisdictions were small, isolated towns that had a tradition of independent local government before being swallowed up by urban growth. Others are newly created communities whose residents wish to live close to the large city but not be legally part of it.

▲ **FIGURE 13-4 SUBURBAN GROWTH AFTER WORLD WAR II** Levittown, Pennsylvania, 1957.

Suburban Lifestyle

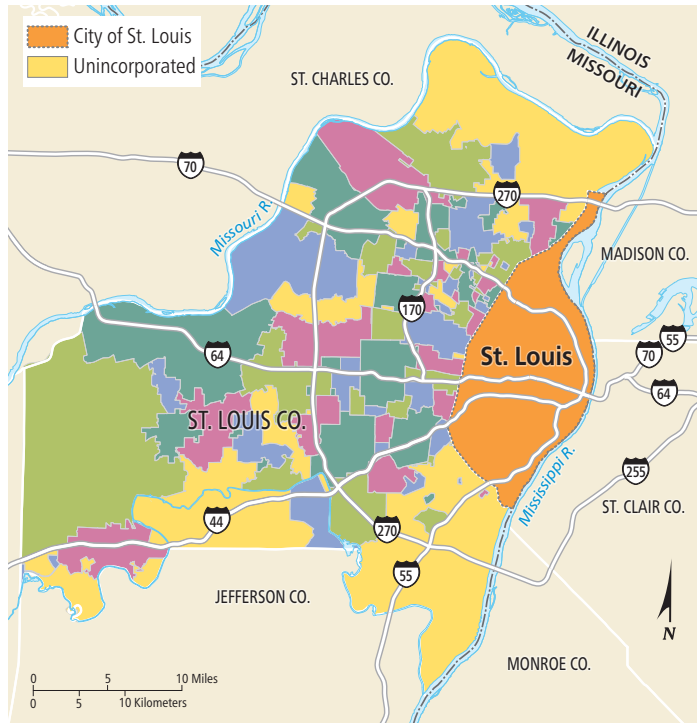
Suburbs offer varied attractions – a detached single-family dwelling rather than a row house or an apartment, private land surrounding the house, space to park cars, and a greater opportunity for home ownership. A suburban house provides space, privacy, and a daily retreat from the stress of urban living. Families with children are especially attracted to suburbs, which offer more space for play and protection from the high crime rates and heavy traffic that characterize inner-city life (Figure 13-6). As incomes rose in the twentieth century, first in the United States and more recently in other developed countries, more families were able to afford to buy suburban homes.

Local Government Fragmentation

Given the difficulty in annexing suburban jurisdictions, local government in the United States is extremely fragmented. According to the 2017 Census of Governments, the United States had 90,075 local governments, including 3,031 counties, 19,495 municipalities, 16,253 townships, 12,754 school districts, and 38,542 special districts. Special districts are organized to provide such services as fire protection, water supply, libraries, and public transportation. Illinois has the largest number of local governments (6,918), and Hawaii has the fewest (21).

The larger metropolitan areas have thousands of local governments, with widely varying levels of resources (Figure 13-7). The large number of local government units has led to calls for a metropolitan government that could coordinate – if not replace – the numerous local governments in an urban area. The fragmentation of local government in the United States makes it difficult to solve regional problems of traffic management, solid-waste disposal, and the building of affordable housing.

▲ **FIGURE 13-6 SUBURBAN LIFESTYLE** Ice cream delivered by the Good Humor Man.



▲ **FIGURE 13-7 MUNICIPALITIES IN ST. LOUIS COUNTY, MISSOURI**

Most U.S. metropolitan areas have a council of governments, which is a cooperative agency consisting of representatives of the various local governments in the region. The council of governments may be empowered to do some overall planning for the area that local governments cannot logically do. Strong metropolitan-wide governments have been established in a few places in North America. Two kinds exist:

- **Consolidations of city & county governments.** Examples of consolidations of city and county governments include Indianapolis and Miami. The boundaries of Indianapolis were changed to match those of Marion County, Indiana. Government functions that were handled separately by the city and the county now are combined into a joint operation called Unigov, with offices in the same building. In Florida, the city of Miami and surrounding Miami-Dade County have a two-tiered federation, with some combined services, but the city boundaries have not been changed to match those of the county.
- **Federations.** Examples of federations include Toronto and other large Canadian cities. Toronto's metropolitan government took effect in 1954, through a federation of 13 municipalities. A two-tier system of government existed until 1998, when the municipalities were amalgamated into a single municipality.

Pause & Reflect 13.1.2 Why might differences exist between the local government where you live and neighboring ones?

The Central Business District

Learning Outcome 13.1.3 Describe distinctive features of a central business district.

The best-known and the most visually distinctive area of most cities is downtown, which is known to geographers by the more precise term **central business district (CBD)**. The CBD is one of the oldest districts in a city, usually at or near the original site of the settlement. The CBDs of older cities are often situated along a body of water, a principal transportation route prior to the twentieth century.

The CBD is compact – less than 1 percent of the urban land area – but contains a large percentage of the public, business, and consumer services (Figure 13-8). Services are attracted to the CBD because of its accessibility. The CBD is the easiest part of the city to reach from the rest of the region and is the focal point of the region's transportation network.

Public Services in CBDs

Public services typically located in a CBD include government offices, libraries, and museums (Figure 13-9). These facilities historically clustered downtown, in many cases in substantial structures. Today, many remain in the CBD to facilitate access for people living in all parts of town. Similarly, semipublic services such as places of worship and social service agencies also cluster downtown, sometimes in handsome historic structures.

Sports facilities and convention centers have been constructed or expanded downtown in many cities. These structures attract a large number of people, including many suburbanites and out-of-towners. Cities place these facilities in the CBD because they hope to stimulate more business for downtown restaurants, bars, and hotels.

▲ **FIGURE 13-9 PUBLIC SERVICE IN LOUISVILLE CBD** Statue of King Louis XIV in front of the Jefferson County Court House.

Pause & Reflect 13.1.3 Do you ever spend time in a CBD? If so, for what reasons? If not, why not?

▼ **FIGURE 13-8 LOUISVILLE, KENTUCKY, CBD**

Public services
1. KFC Yum! Center
2. Kentucky International Convention Center
3. Belle of Louisville
4. Muhammad Ali Center

Business services
5. LG&E Center
6. Fifth Third Bank
7. 400 West Market
8. PNC Plaza
9. Waterfront Plaza
10. National City Bank
11. BB&T Bank
12. Humana

Consumer services
13. Courtyard by Marriott
14. Marriott
15. 4th St Live!
16. Hyatt Regency
17. Galt House Hotel

Business Services in CBDs

Offices cluster in a CBD for accessibility (Figure 13-10). People in business services such as advertising, banking, finance, journalism, and law particularly depend on proximity to professional colleagues. Lawyers, for example, choose locations near government offices and courts. Services such as temporary secretarial agencies and instant printers locate downtown to be near lawyers, forming a chain of interdependency that continues to draw offices to the CBD.

Even with the diffusion of modern telecommunications, many professionals still exchange information with colleagues primarily through face-to-face contact. Financial analysts discuss attractive stocks or impending corporate takeovers. Lawyers meet to settle disputes out of court. Offices are centrally located to facilitate rapid communication of fast-breaking news through spatial proximity. Face-to-face contact also helps establish a relationship of trust based on shared professional values.

A central location also helps businesses that employ workers from a variety of neighborhoods. Top executives may live in one neighborhood, junior executives in another, secretaries in another, and custodians in still another. A central location is most readily accessible to all groups. Firms that need highly specialized employees are more likely to find them in the central area, perhaps currently working for another company downtown.

Most downtown offices were closed during the first months of the COVID-19 pandemic. Employees of downtown offices worked from home and communicated with other employees through videoconferencing. Once the pandemic began to subside and downtown offices reopened, a significant share of employees continued to work from home, at least for part of the week, bringing into question the extent to which business services will cluster in the CBD in the future.

Consumer Services in CBDs

In the past, three types of retail services clustered in a CBD because they required accessibility to everyone in the region: retailers with high thresholds, those with high ranges, and those that served people working in the CBD. Changing shopping habits and residential patterns have reduced the importance of retail services in the CBD.

Retailers with High Thresholds. Retailers with high thresholds, such as department stores, traditionally preferred a CBD location in order to be accessible to many people. Large department stores in the CBD would cluster near one intersection, which was known as the "100 percent corner." Rents were highest there because that location had the highest accessibility for the most customers. Most high-threshold shops such as large department stores have closed their downtown branches. Surviving department stores with high thresholds are now mostly in the suburbs.

Retailers with High Ranges. High-range retailers are often specialists, with customers who patronize them infrequently. These retailers once preferred CBD locations because their customers were scattered over a wide area. For example, a jewelry or clothing store attracted shoppers from all over the urban area, but each customer visited infrequently. Like those with high thresholds, surviving high-range retailers have moved with department stores to suburban locations.

▲ **FIGURE 13-10 BUSINESS SERVICE IN LOUISVILLE CBD** 400 West Market, the tallest building in Louisville.

Some retailers with high ranges have located in CBDs because they are visited by tourists. Local residents also patronize shops and restaurants in the CBD as a leisure activity on evenings and weekends (Figure 13-11).

Retailers Serving CBD Workers. A third type of retail activity in the CBD serves the many people who work in the CBD and shop during lunch or working hours. These retailers sell office supplies, computers, and clothing or offer shoe repair, rapid photocopying, dry cleaning, and so on. In contrast to the other two types of retailers, shops that appeal to nearby office workers were more likely to survive in the CBD, at least prior to the COVID-19 lockdown. Patrons of downtown shops were primarily downtown employees who shopped during the lunch hour.

A large share of the retailers closed during the COVID-19 lockdown when most employees of downtown offices worked from home. Many retailers serving CBD workers have not reopened even after lockdowns ended because many employees of downtown offices have continued to work from home at least part of the week.

▼ **FIGURE 13-11 CONSUMER SERVICE IN LOUISVILLE CBD** Fourth Street Live! entertainment district.

Competing for Space in CBDs

Learning Outcome 13.1.4 Describe the use of vertical space in the CBD and the exclusion of some land uses.

A CBD's accessibility produces extreme competition for the limited available land. As a result, land values are very high in the CBD. In a rural area a hectare (100 acres) of land might cost several thousand dollars. In a suburb it might run tens of thousands of dollars. In the CBD of a global city like London or New York, if a hectare of land were even available, it would cost more than $100 million (Figure 13-12).

As a result of intense competition for land, the CBD has distinctive features:

- Land uses commonly found elsewhere in the urban area are rare in the CBD, especially industrial and residential activities.
- The CBD has a three-dimensional character, with more space used below and above ground level than elsewhere in the urban area.

Removing Manufacturing from the CBD

Modern factories require large parcels of land to spread operations among one-story buildings. Suitable land is generally available in suburbs. In the past, inner-city factories and retail establishments relied on waterfront CBDs that were once lined with piers for cargo ships to load and unload and warehouses to store the goods (Figure 13-13a). Today's large oceangoing vessels are unable to maneuver in the tight, shallow waters of the old CBD harbors. Consequently, port activities have moved to more modern facilities downstream.

Port cities have transformed their waterfronts from industrial to commercial and recreational activities. Derelict warehouses and rotting piers have been replaced with new residences, offices, shops, parks, and museums. As a result, CBD waterfronts have become tourist attractions in a number of North American cities, including Boston, Toronto, Baltimore (Figure 13-13b), and San Francisco as well as in European cities such as Barcelona and London. The cities took the lead in clearing the sites and constructing new parks, docks, walkways, museums, and parking lots. They have also built large convention centers to house professional meetings and trade shows. Private developers have added hotels, restaurants, boutiques, and entertainment centers to accommodate tourists and conventioneers.

▲ **FIGURE 13-12 ONE HECTARE OF LAND IN NEW YORK CITY** New York's Central Park occupies 340 hectares (840 acres). The Metropolitan Museum of Art building occupies around 4 hectares (10 acres). The blocks immediately across Fifth Avenue from the museum are each 1 hectare (2.5 acres).

Residents in the CBD

Many people used to live in or near the CBD. Some residents jammed into tiny, overcrowded apartments, while others occupied spacious mansions. In the twentieth century, most residents abandoned downtown living because of a combination of pull and push factors. They were pulled to suburbs that offered larger homes with private yards and modern schools. And they were pushed from CBDs by high rents that they could not afford but that business and retail services were willing to pay, and they were pushed as well as by the dirt, crime, congestion, and poverty of downtown living.

In the twenty-first century, however, the population of many U.S. CBDs has increased. New apartment buildings and townhouses have been constructed, and abandoned warehouses and outdated office buildings have been converted into residential lofts. High-rise buildings that once housed business services are being converted to apartments in many U.S. CBDs. Downtown living is especially attractive to "empty nesters" whose children have left home or young professionals who do not have children. These two groups are attracted by the entertainment, restaurants, museums, and nightlife that are clustered downtown, and they are less concerned with the quality of neighborhood schools. Despite the growth in population in the center of some U.S. cities, some consumer services, such as grocery stores, may still be lacking.

Pause & Reflect 13.1.4 What might be the attractions of living in a former factory near the CBD?

(a)

(b)

◀ **FIGURE 13-13 BALTIMORE INNER HARBOR** (a) In 1903, industry was the principal land use. (b) In recent years, shops, restaurants, marinas, the National Aquarium, and other consumer services have replaced industry in Baltimore's Inner Harbor.

The Vertical CBD: Skyscrapers

The CBD makes more intensive use of space below- and aboveground. Demand for space in CBDs has made the construction of high-rise structures economically feasible. Skyscrapers are an interesting example of "vertical geography" (Figure 13-14). The nature of an activity influences which floor it occupies in a typical high-rise building.

Downtown skyscrapers give a city one of its most distinctive appearances and unifying symbols. Suburban houses, shopping malls, and factories look much the same from one city to another, but each city has a unique downtown skyline, resulting from the particular arrangement and architectural styles of its high-rise buildings.

The first skyscrapers were built in Chicago in the 1880s, made possible by several inventions, including the elevator, steel girders, and tempered glass. Artificial lighting, ventilation, central heating, and air-conditioning helped adjacent properties overcome problems caused by skyscrapers blocking light and air movement. Most North American and European cities enacted zoning ordinances early in the twentieth century in part to control the location and height of skyscrapers.

The one large U.S. CBD without skyscrapers is Washington, D.C., where no building is allowed to be higher than the U.S. Capitol dome. Consequently, offices in downtown Washington rise no more than 160 feet (49 meters). As a result, the typical Washington office building uses more horizontal space – land area – than in other cities. Thus the city's CBD spreads over a much wider area than those in cities of comparable population.

▲ **FIGURE 13-14 JOHN HANCOCK CENTER, CHICAGO** The lower floors of the Hancock Center contain consumer services such as restaurants. The middle floors contain business service offices. The upper floors contain apartments. The top two floors contain consumer services, including an observation deck, restaurant, and bar. On a damp, cloudy day, the residents of the apartments and the visitors to the observation deck can't see the street level.

The Vertical CBD: Underground

A vast underground network exists beneath most CBDs. The typical "underground city" includes garages, loading docks for deliveries to offices and shops, and pipes for water and sewer service. Telephone, electric, TV, and broadband cables run beneath the surface as well because not enough space is available in the CBD for the large number of overhead poles that would be needed for such a dense network and the wires would be unsightly and hazardous. Subway trains run beneath the streets of large CBDs.

Cities in cold-weather climates, such as Montréal and Toronto, have built extensive underground pedestrian passages and shops (Figure 13-15). These underground areas segregate pedestrians from motor vehicles and shield them from harsh winter weather (Figure 13-16).

▼ **FIGURE 13-15 UNDERGROUND MONTRÉAL** Montréal's Underground City is the world's largest underground complex. It is known as RÉSO, which is an abbreviation for Réseau Souterrain (underground network) and a homophone of the French word *réseau* (network).

▼ **FIGURE 13-16 ABOVEGROUND MONTRÉAL** Winter in Montréal discourages outdoor shopping.

KEY ISSUE

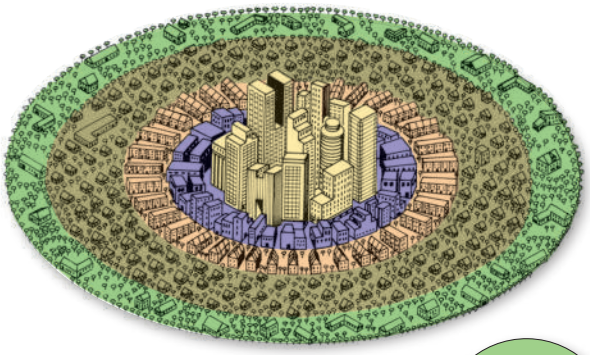
13.2 | Where Are People Distributed Within the Cities of Developed Countries?

People are not distributed randomly within an urban area. They concentrate in particular neighborhoods, depending on their social characteristics. Geographers describe where different groups of people are likely to live within an urban area, and they offer explanations for why these patterns occur.

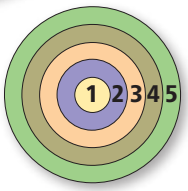
Models of Urban Structure

Learning Outcome 13.2.1 Describe three models of the internal structure of urban areas.

Sociologists, economists, and geographers have developed three models to help explain where different groups of people tend to live in an urban area – the concentric zone, sector, and multiple nuclei models. In addition, the galactic (or peripheral) model is a variation of the multiple nuclei model.



1 Central business district
2 Zone of transition
3 Zone of independent workers' homes
4 Zone of better residences
5 Commuter's zone



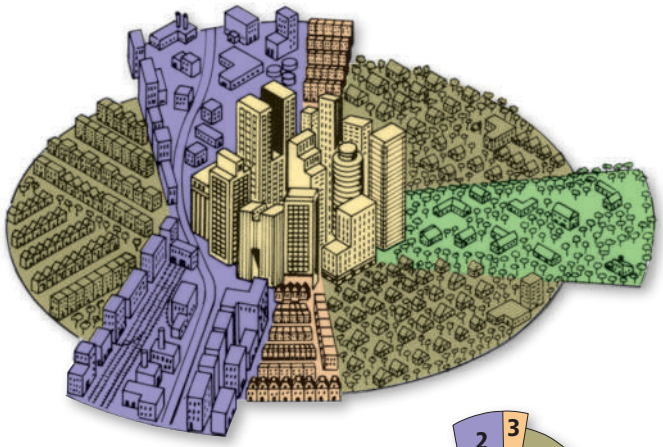
▲ **FIGURE 13-17 CONCENTRIC ZONE MODEL** Burgess named each zone, but those names are no longer appropriate.

Concentric Zone Model

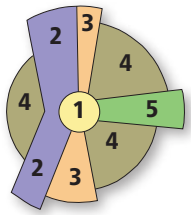
According to the **concentric zone model**, created in 1925 by sociologist Ernest Burgess, a city grows outward from a central area in a series of concentric rings, like the growth rings of a tree. Back in the 1920s, Burgess identified five rings, using terms widely used at the time that have since become obsolete (Figures 13-17 and 13-18). The precise number and width of the rings vary from one city to another, but some rings appear in every city in roughly the same order.

Sector Model

According to the **sector model**, developed in 1939 by land economist Homer Hoyt, a city develops in a series of sectors that Hoyt identified with labels widely used at the time (Figure 13-19). Certain areas of the city are more attractive for various activities, originally because of an environmental factor or even by chance. As a city grows, activities expand outward in wedges, or sectors, from the center. Each sector takes on a distinctive character. For example, modest housing may be built in one sector and expensive housing in another sector (Figure 13-20). Industrial activities develop in another sector.



1 Central business district
2 Transportation and industry
3 Low-class residential
4 Middle-class residential
5 High-class residential



▲ **FIGURE 13-19 SECTOR MODEL** Hoyt gave names to each zone that are now obsolete.

▼ **FIGURE 13-18 ZONE OF INDEPENDENT WORKERS HOMES** Chicago.

▼ **FIGURE 13-20 HIGH-INCOME RESIDENTIAL SECTOR** Chicago's North Side.

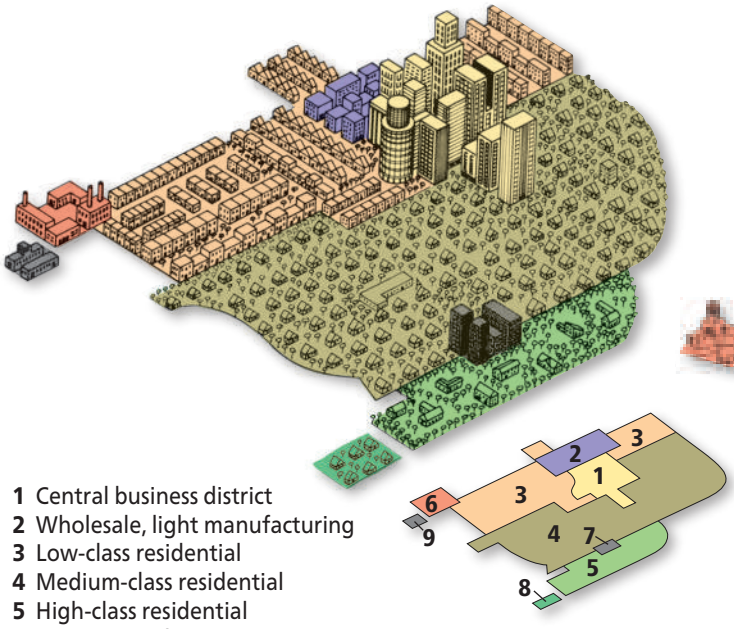
Multiple Nuclei & Galactic Models

According to the **multiple nuclei model**, developed by geographers Chauncy Harris and Edward Ullman in 1945, a city is a complex structure that includes a CBD as well as other nodes around which activities occur. Examples of these nodes include a port, a neighborhood business center, a university, an airport, and a park.

The multiple nuclei theory states that some activities are attracted to particular nodes, whereas others try to avoid them (Figure 13-21). For example, a university node may attract well-educated residents, pizzerias, and bookstores (Figure 13-22), whereas an airport may attract hotels and warehouses. On the other hand, incompatible land-use activities avoid clustering in the same locations. Heavy industry and high-class housing, for example, rarely exist in the same neighborhood.

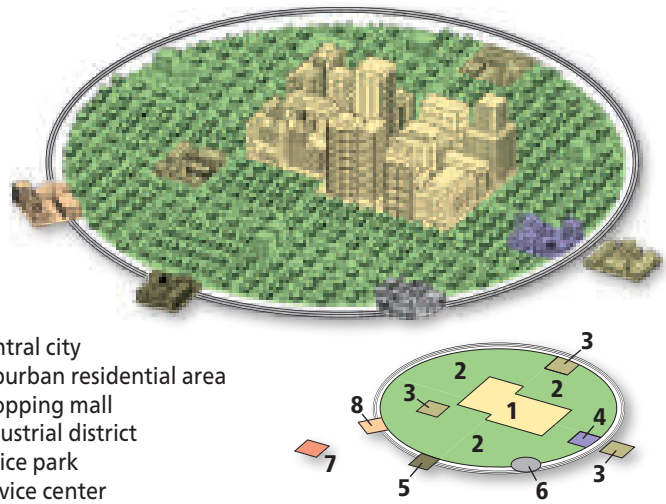
According to the **galactic (or peripheral) model**, developed by Chauncy Harris in 1960, an urban area consists of an inner city surrounded by large suburban residential and service nodes or nuclei tied together by a beltway or ring road (Figure 13-23). Rather than an entirely new model, Harris considered the peripheral model to be a modification of the multiple nuclei model (which he had co-authored), reflecting the growth of suburbs. The nodes of consumer and business services around the beltway are called **edge cities** (Figure 13-24).

Pause & Reflect 13.2.1 If you cut down a large tree and looked at the cross-section, which of the three urban structure models will the tree's cross-section resemble? Why is the cross-section of a tree a good analogy for one of the models of urban structure?



1 Central business district
2 Wholesale, light manufacturing
3 Low-class residential
4 Medium-class residential
5 High-class residential
6 Heavy manufacturing
7 Outlying business district
8 Residential suburb
9 Industrial suburb

▲ **FIGURE 13-21 MULTIPLE NUCLEI MODEL**



1 Central city
2 Suburban residential area
3 Shopping mall
4 Industrial district
5 Office park
6 Service center
7 Airport complex
8 Combined employment & shopping center

▲ **FIGURE 13-23 GALACTIC (PERIPHERAL) MODEL**

▼ **FIGURE 13-22 NODE** The University of Chicago.

▼ **FIGURE 13-24 EDGE CITY** Woodfield Mall, near Chicago, is one of the largest malls in the United States.

Applying the Urban Models in North America

Learning Outcome 13.2.2 Analyze how the three urban structure models help explain where people live.

The models of urban structure help us understand where people with different social characteristics tend to live within an urban area. They can also help explain why certain groups of people tend to live in particular places.

Social Area Analysis

The study of where people of varying living standards, ethnic backgrounds, and lifestyles live within an urban area is **social area analysis**. Social area analysis helps create an overall picture of where various groups of people tend to live, depending on their particular personal characteristics.

Social area analysis depends on the availability of data at the scale of individual neighborhoods. In the United States and many other countries, that information comes from the census. Urban areas in the United States are divided into **census tracts** that each contain approximately 5,000 residents and correspond, where possible, to neighborhood boundaries. The census also divides the entire United States into blocks, which are typically a collection of several dozen houses; inside urban areas, blocks are typically bounded by four streets. A block group, as the name implies, is a collection of several neighboring blocks.

Every decade the U.S. Bureau of the Census publishes data summarizing the characteristics of the residents and the housing in each tract. Annual estimates are issued through the American Fact Finder service of the census's American Community Survey program. Examples of information the census provides at the tract level include the number of various ethnicities, the median income of all families, and the percentage of adults who finished high school.

The spatial distribution of any of these social characteristics can be plotted on a map of the community's census tracts. Computers have become invaluable in this task because they permit rapid creation of maps and storage of voluminous data about each census tract. Relatively little is available at the block level, however, because the number of people is so small that publishing the information could violate the privacy of individuals.

Social Area Analysis: Concentric Zones

Consider two households with the same income and ethnic background. One household lives in a newly constructed home, whereas the other lives in an older one. The concentric zone model suggests (Figure 13-25) that the household in the older house is much more likely to live in an inner ring (Figure 13-26) and the household in the newer house in an outer ring (Figure 13-27).

FIGURE 13-25 CONCENTRIC ZONES IN SAN ANTONIO: AGE OF HOUSING The outer ring has a higher percentage of recently built housing.

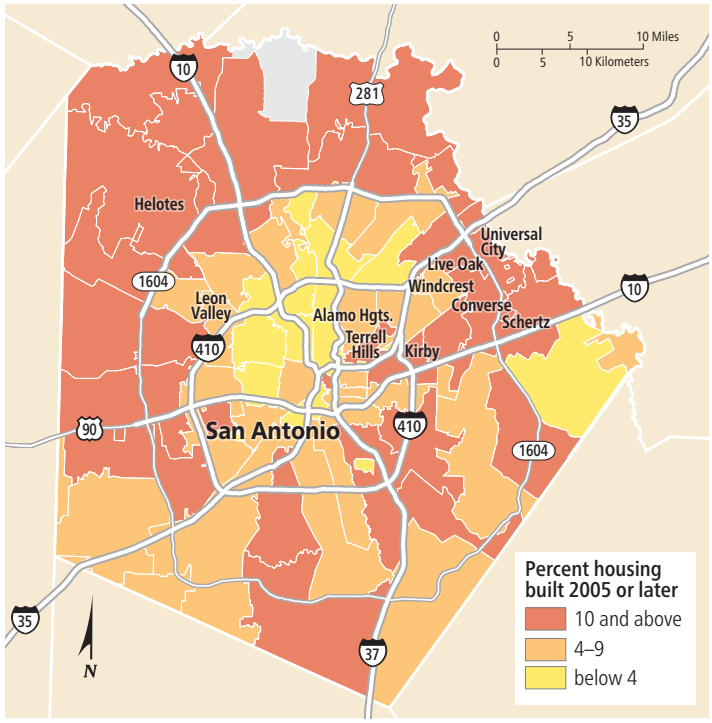


FIGURE 13-26 SAN ANTONIO INNER RING: OLDER HOUSING King William Historic District.

FIGURE 13-27 SAN ANTONIO OUTER RING: NEWER HOUSING

Social Area Analysis: Sectors

Given two households who own their homes, the sector model suggests that the household with a more modest income is unlikely to live in the same sector of the city as the household with the higher income (Figure 13-28). For example, in San Antonio, a household with a relatively high income is most likely to live in the northern sector of the urban area (Figure 13-29).

Social Area Analysis: Nuclei

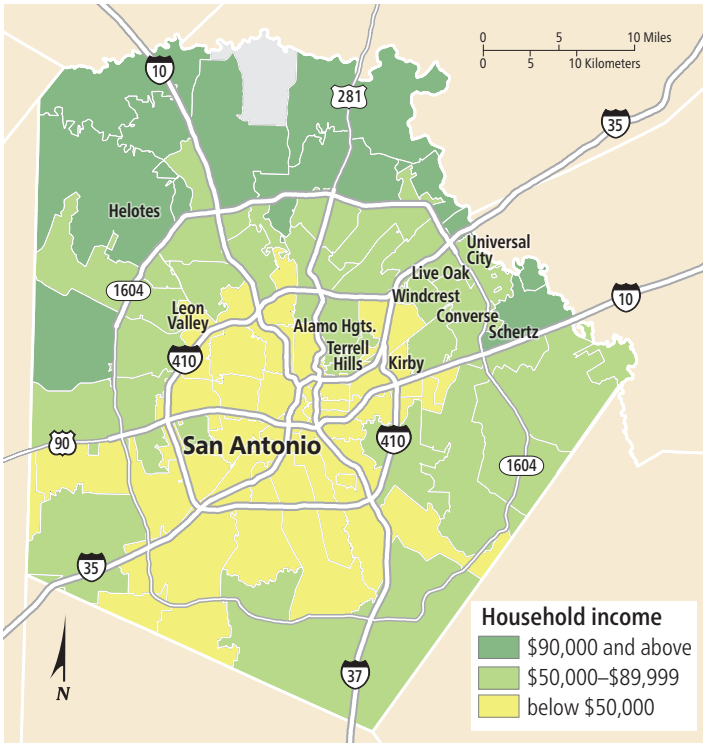
People with the same ethnic or racial background are likely to live near each other (Figures 13-30 and 13-31).

Limitations of the Models

None of the urban models taken individually completely explains why different groups of people live in distinctive parts of a city. If the models are combined rather than considered independently, they help geographers explain where different groups of people live in a city. Putting the three urban models together, we can identify, for example, the neighborhood in which a high-income Asian American owner-occupant is most likely to live.

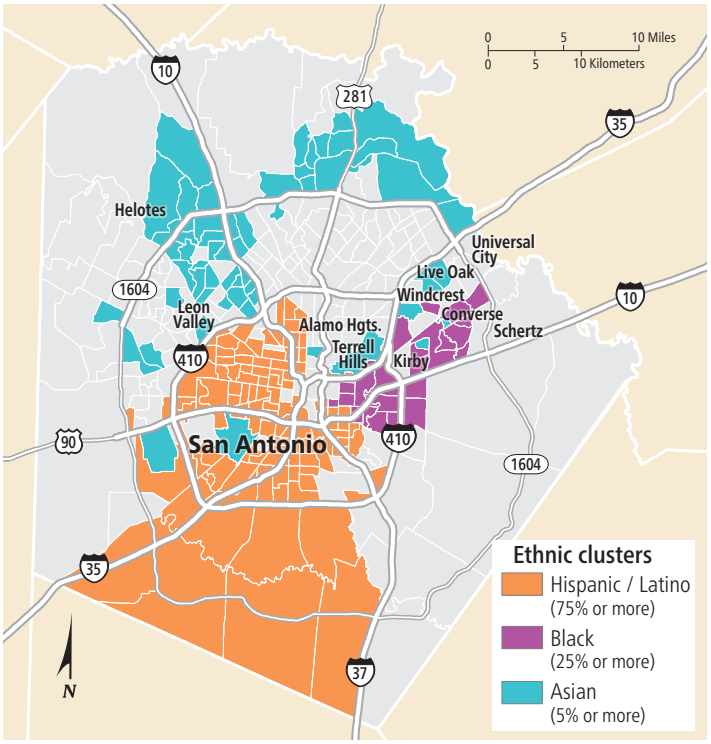
Still, critics point out that the models are too simple and fail to consider the variety of reasons that lead people to select particular residential locations. Because the three models are all based on conditions that existed in U.S. cities during the mid-twentieth century, critics also question their relevance to contemporary urban patterns in the United States or in other countries.

Pause & Reflect 13.2.2 Would you expect the distribution of families with children to follow most closely the concentric zone, sector, or multiple nuclei model? Why?



▲ **FIGURE 13-28 SECTORS IN SAN ANTONIO: INCOME** Higher-income people tend to live in the northern sector.

▼ **FIGURE 13-29 SAN ANTONIO SECTOR OF RELATIVELY HIGH-INCOME HOUSEHOLDS** Housing in Helotes, a San Antonio suburb in the northern sector.



▲ **FIGURE 13-30 MULTIPLE NUCLEI IN SAN ANTONIO: RACE AND ETHNICITY** Black Americans, Asian Americans, and Hispanic Americans cluster in different nodes.

▼ **FIGURE 13-31 SAN ANTONIO HISPANIC NODE**

Applying the Urban Models in Europe

Learning Outcome 13.2.3 Relate the models of urban structure to urban areas in Europe.

American urban areas differ from those elsewhere in the world. These differences do not invalidate the three models of internal urban structure, but they do point out that social groups in other countries may not have the same reasons for selecting particular neighborhoods within their cities as do groups in U.S. cities.

CBDs in Europe

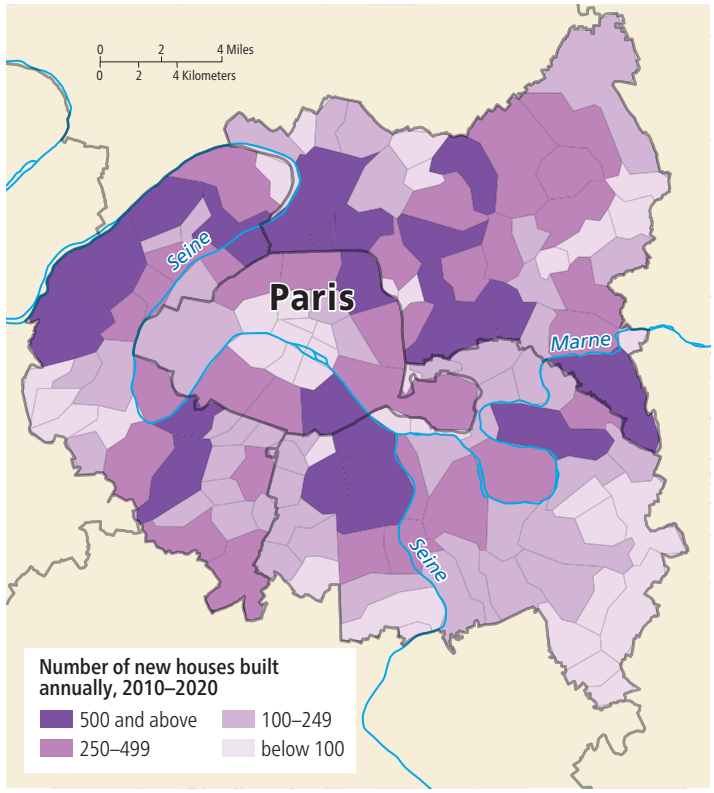
Europe's CBDs have a different mix of land uses than those in North America. Differences stem from the medieval origins of many of Europe's CBDs. European cities display a legacy of low-rise structures and narrow streets, in many cases built several-hundred years ago.

- **Residences.** More people live downtown in cities outside North America. The CBD of Paris covering around 6 square kilometers (2 square miles) has about 100,000 residents. A comparable area around the CBD of Detroit has around 10,000 residents.
- **Consumer services.** More people live in Europe's CBDs in part because they are attracted to the concentration of consumer services, such as cultural activities and animated nightlife. And with more people living there, Europe's CBDs in turn contain more day-to-day consumer services, such as groceries, bakeries, and butchers.
- **Public services.** The most prominent structures in Europe's CBDs are often public and semipublic buildings, such as churches and former royal palaces, situated on the most important public squares. Parks in Europe's CBDs were often first laid out as private gardens for aristocratic families and later were opened to the public.
- **Business services.** Europe's CBDs contain professional and financial services. However, business services in Europe's CBDs are less likely to be housed in skyscrapers than those in North America. Some European cities try to preserve their historic CBDs by limiting high-rise buildings. For example, after a couple of high-rise buildings were constructed in Paris, the city limited building height to 31 meters (102 feet).

Many service providers wish to be in the center of European cities, but constructing new buildings is difficult. The alternative is renovation of older buildings. However, renovation is more expensive and may not produce enough space to meet the demand. As a result, rents are much higher in the center of European cities than in U.S. cities of comparable size.

Concentric Zones in Europe

The urban structure within Paris can be used to illustrate similarities and differences in the distribution of people within U.S. and European cities. As in U.S. urban areas, the newer housing in the Paris region is in outer rings and the older housing is closer to the center (Figure 13-32). Most of the housing in central Paris was constructed in the nineteenth century. The buildings were typically seven or eight stories, with retailers on the lower floors and apartments in the upper floors (Figure 13-33). Unlike U.S. urban areas, though, much of the newer suburban housing is in high-rise apartments rather than single-family homes (refer to Figure 13-35).

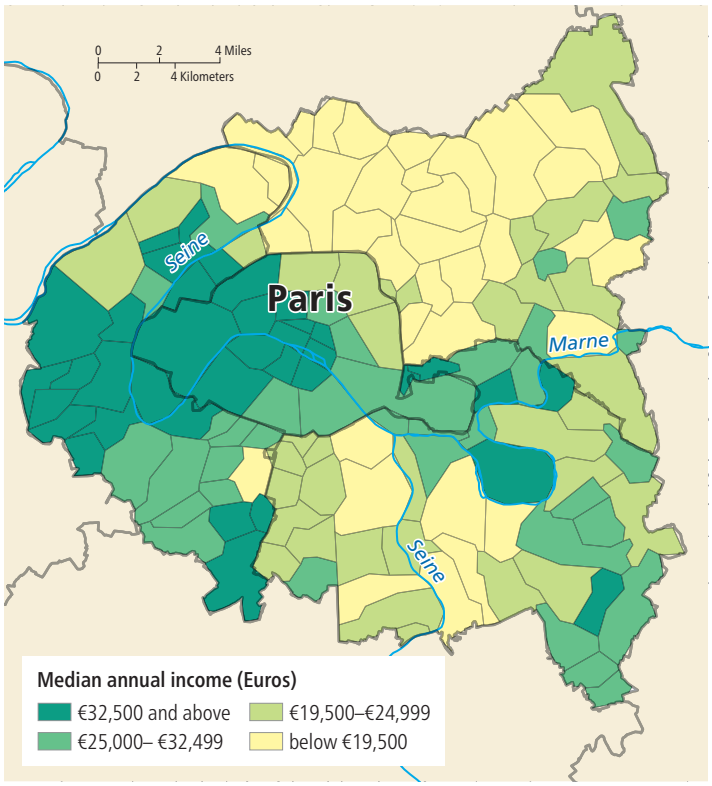


▲ **FIGURE 13-32 CONCENTRIC ZONES IN PARIS** Most new houses are being built in outer rings.

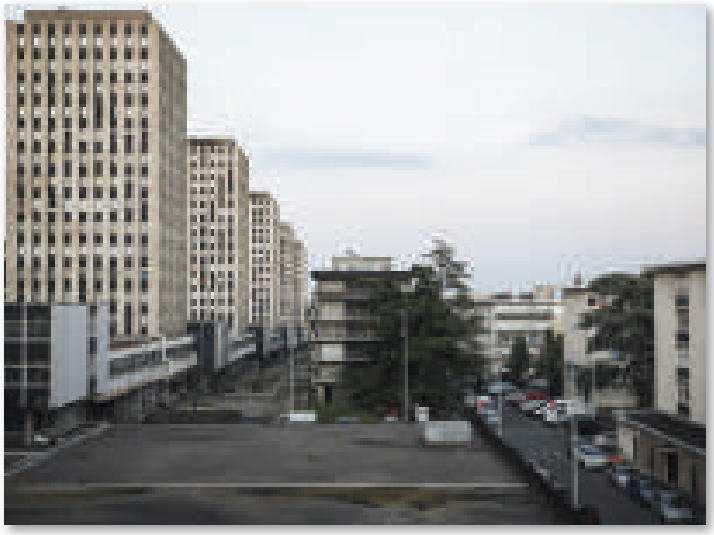
▲ **FIGURE 13-33 PARIS INNER RING: OLDER HOUSING** Older housing situated above shops in the inner ring of Paris.

Sectors in Europe

Similar to U.S. urban areas, people with different incomes tend to cluster in different sectors in the Paris region (Figure 13-34). People with higher incomes are more likely to live in a sector to the west, whereas people with lower incomes are more likely to live in a sector to the north (Figure 13-35). The preference of people with higher incomes to cluster in a sector to the west was influenced by a desire to be near royal palaces and a preference to be farther away from factories built in other sectors along the Seine and Marne river valleys.



▲ **FIGURE 13-34 SECTORS IN PARIS: INCOME**

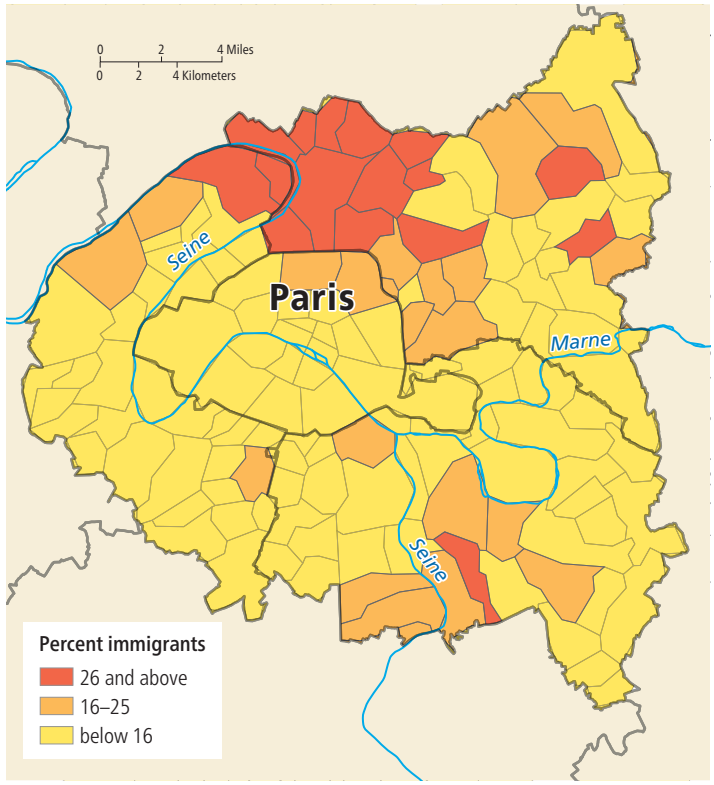


▲ **FIGURE 13-35 PARIS SECTOR OF RELATIVELY LOW INCOME HOUSEHOLDS** Sarcelles is a suburb located in the northern sector.

Multiple Nuclei in Europe

European urban areas, including Paris, have experienced a large increase in immigration from other regions of the world (see Chapter 3). In contrast to U.S. urban areas, most ethnic and racial groups of immigrants reside in the suburbs of Paris (Figures 13-36 and 13-37).

Pause & Reflect 13.2.3 Are Paris's famous tourist sites located predominantly in inner or outer rings? Why might this be the case?



▲ **FIGURE 13-36 MULTIPLE NUCLEI IN PARIS: FOREIGN-BORN** France does not collect data on ethnicity and race. Estimates are made based on number of immigrants.

▲ **FIGURE 13-37 PARIS NODE OF IMMIGRANTS FROM AFRICA** Many immigrants to the Paris area from Africa live in suburbs to the north.

KEY ISSUE

13.3 | Where Are People Distributed Within the Cities of Developing Countries?

Cities in developing countries may date from ancient times. For most of recorded history, the world's largest cities have been in Asia. However, until modern times, most Asian people lived in rural settlements.

Premodern Cities in Developing Countries

Learning Outcome 13.3.1 Describe patterns in precolonial and colonial cities in developing countries.

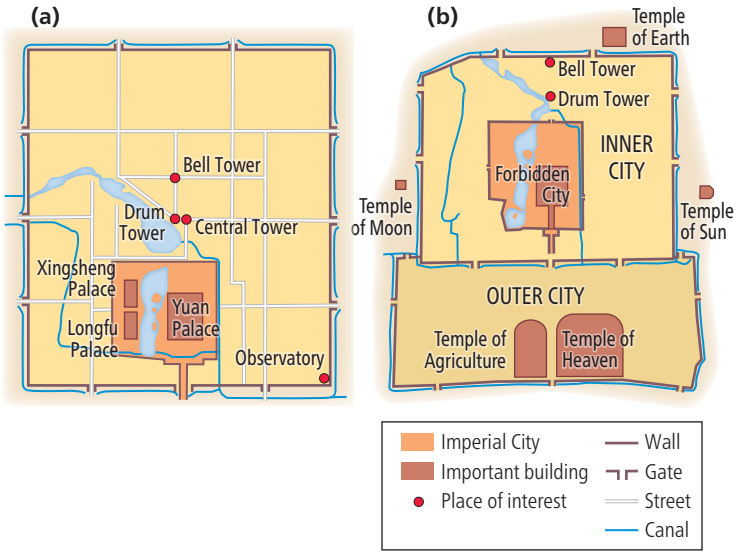
The ancient and medieval structure of Asian cities was influenced by the cultural values of the indigenous peoples living there. In many cases, these cities passed through a period of restructuring at the hands of European colonial rulers.

Medieval City: Beijing

Archaeological evidence of Beijing dates from 1045 B.C.E., according to official government studies, although the city may have been founded thousands of years earlier. A succession of invaders and dynasties shaped what is now the central area of Beijing. The Yuan and Ming dynasties had especially strong impacts on the early structure of Beijing.

Beijing During the Yuan Dynasty. Kublai Khan, founder of the Yuan dynasty, constructed a new city called Dadu beginning in 1264 (Figure 13-38a). The Drum Tower was constructed at the center of the city in 1272 (Figure 13-39). The heart of Dadu was three palaces built on Qionghua Island in the middle of Taiye Lake. The two palaces to the west of the lake housed the imperial family, and the eastern one contained offices. Residential areas were laid out in a checkerboard pattern divided by wider roads and narrower alleys. Three markets were placed in the residential areas. An outer wall surrounded the residential areas, and an inner wall surrounded the palaces.

Beijing During the Ming Dynasty. After capturing Dadu in 1368, the Ming dynasty reconstructed it over the next several decades (Figure 13-38b). The imperial palaces were demolished and replaced with new structures, including the Forbidden City and the Temple of Heaven (Figure 13-40). Other temples were added in the sixteenth century. The city took on the current name Beijing ("Northern Capital") in 1403.



▲ **FIGURE 13-38 MEDIEVAL BEIJING** (a) Beijing (Dadu) during the Yuan Dynasty. (b) Beijing during Ming Dynasty.

▲ **FIGURE 13-39 DRUM TOWER, BEIJING**

▲ **FIGURE 13-40 FORBIDDEN CITY, BEIJING**

Colonial Legacy

When Europeans gained control of much of Africa, Asia, and Latin America, their colonial policies left a heavy mark on many cities. One feature of European control was the imposition of standardized plans for cities. For example, all Spanish cities in Latin America were built according to the Laws of the Indies, signed in 1573. The laws explicitly outlined how colonial cities were to be constructed – a gridiron street plan centered on a church and central plaza, walls around individual houses, and neighborhoods built around smaller plazas with parish churches or monasteries.

In some places, European colonial powers built a new city next to the existing one. Fès (Fez), Morocco, is an example of a city that consists of two separate and distinct nodes – a precolonial city that existed before the French gained control and one built by the French colonialists (Figure 13-41). The precolonial Islamic city was laid out surrounding a mosque. The center also had a bazaar or marketplace, known as the Medina, which served as the commercial core. The old quarters had narrow, winding streets, little open space, and cramped residences (Figure 13-42).

The new city of Fès was the location for colonial services, such as administration, military command, and international trade, as well as housing for European colonists. Compared to the precolonial node, the European district contained wider streets and public squares, larger houses surrounded by gardens, and much lower density.

In other cases, European colonial powers simply demolished the precolonial city. For example, the French colonial city of Saigon, Vietnam (now Ho Chi Minh City), was built by demolishing most of the existing city. Only a handful of precolonial buildings survived.

Pause & Reflect 13.3.1 Which node in Fès do you think would be more interesting to visit, the Medina or the French colonial center? Why?

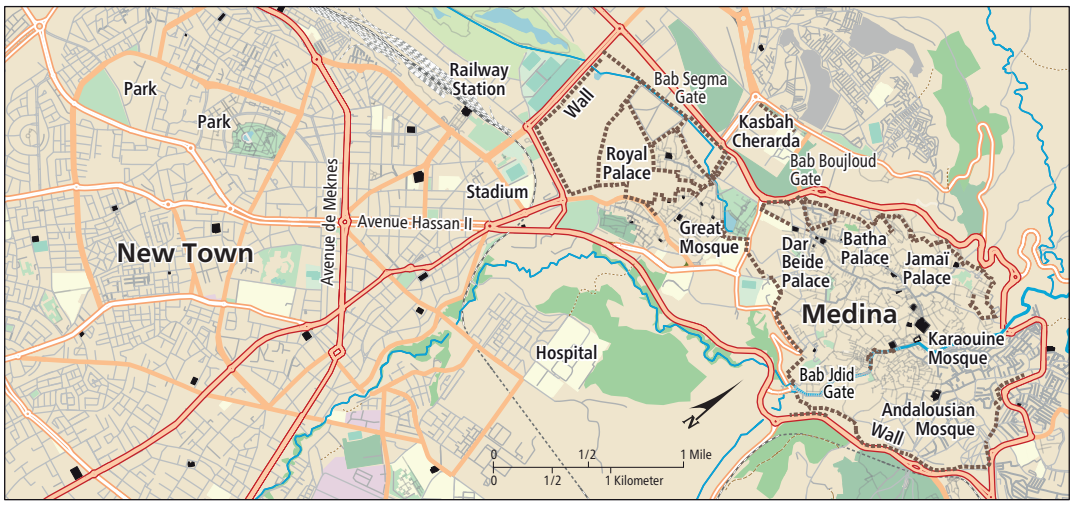


FIGURE 13-41 PRECOLONIAL AND COLONIAL FÈS (FEZ): STREET PATTERNS The precolonial town to the east (Medina on the map) had narrow irregularly arranged streets and numerous mosques. The French colonial administration laid out an entirely new district in the west (New Town on the map), with geometrically arranged streets and squares.

FIGURE 13-42 FÈS (FEZ) MOROCCO OLD AND NEW TOWNS Looking west, the Medina (Old Town) is in the foreground, and the French-built New Town is in the background. A portion of the wall that encircles the Medina is visible between the Old Town and New Town.

Applying the Urban Models in Developing Countries

Learning Outcome 13.3.2 Understand how the three models of urban structure describe patterns in cities in developing countries.

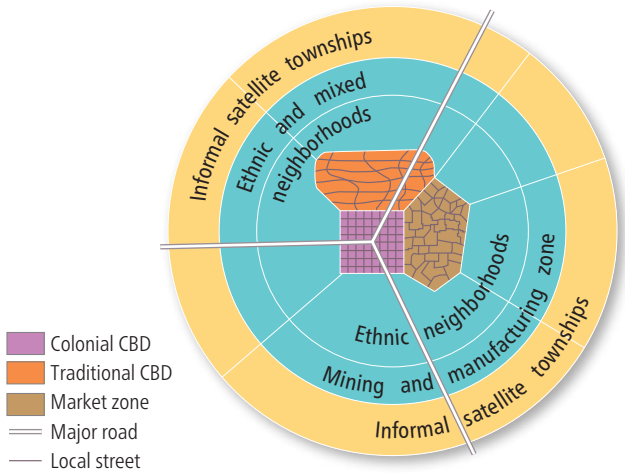
The models of urban structure described earlier in this chapter (concentric zone, sector, and multiple nuclei) help explain contemporary patterns within the urban areas in developing countries. Rapid growth of population and land area has strengthened the applicability of the models in some cities but reduced their usefulness in other cases.

Concentric Zones in Developing Countries

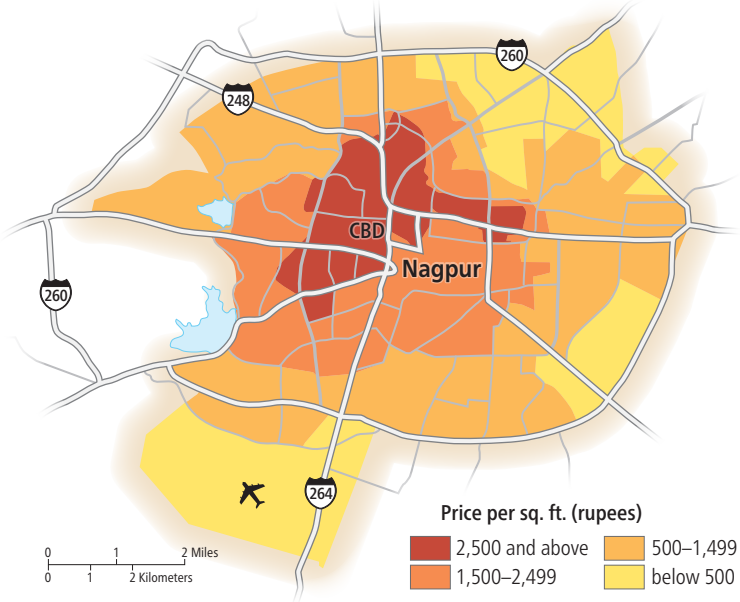
The concentric zone model has been applied most frequently to cities in developing countries. Geographer Harm deBlij's model of sub-Saharan African cities is an example (Figure 13-43). The inner rings house people with more wealth. Inner rings have the most attractive residential areas because they are near business and consumer services, and they offer such vital public services as water, electricity, paved roads, and garbage pickup.

As cities grow rapidly in developing countries, rings are constantly being added on the periphery to accommodate immigrants from rural areas attracted by job opportunities (Figure 13-44). For example, in Nagpur, India, an urban area of 3 million inhabitants, the highest-cost housing is in the center, and the cost of housing declines in outer rings (Figure 13-45).

Much of the housing in the outer rings is in informal settlements, also known as squatter settlements. The United Nations defines an **informal settlement** as a residential area where housing has been built on land to which the occupants have no legal claim or has not been built to the city's standards for legal buildings.



▲ **FIGURE 13-43 CONCENTRIC ZONE MODEL APPLIED TO CITIES IN DEVELOPING COUNTRIES** Harm DeBlij's model.



▲ **FIGURE 13-44 CONCENTRIC ZONE MODEL APPLIED TO NAGPUR, INDIA** People with more wealth are more likely to live in an inner ring, whereas people with limited incomes are more likely to live in an outer ring.

Informal settlements are known by a variety of names, including *barriadas* and *favelas* in Latin America, *bidonvilles* in North Africa, *bustees* in India, *gecekondu* in Türkiye, and *barong-barong* in the Philippines. The United Nations estimated that more than 1 billion people lived in informal settlements in 2020.

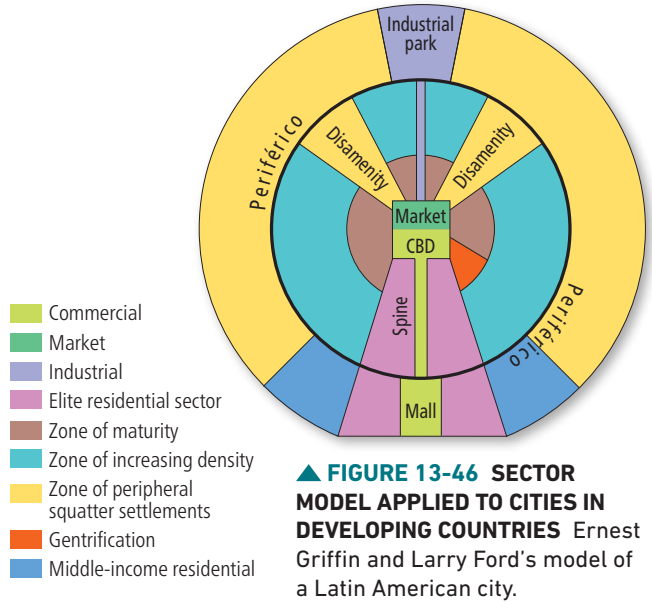
Informal settlements have few services because neither the city nor the residents can afford them. Homes are in basic shelters made with scavenged cardboard, wood boxes, sackcloth, and crushed beverage cans. Latrines may be designated by the settlement's leaders, and water is carried from a central well or dispensed from a truck. Electricity service may be stolen by running a wire from the nearest power line. In the absence of bus service or available private cars, a resident may have to walk two hours to reach a place of employment.

▲ **FIGURE 13-45 OUTER RING HOMES, NAGPUR, INDIA** People with limited incomes and recent immigrants to the city are more likely to live in modest housing in an outer ring.

Sectors in Developing Countries

Geographers Ernest Griffin and Larry Ford show that in Latin American cities, people with relatively high incomes push out from the center in a well-defined elite residential sector (Figure 13-46). The elite sector forms on either side of a narrow spine (the green commercial area in Figure 13-46) that contains offices, shops, and amenities, such as restaurants, theaters, parks, and zoos. For example, Santiago, Chile, has an elite sector extending northeast from the CBD (Figure 13-47).

People with relatively high incomes are also attracted to the center and spine because services such as water and electricity are more readily available and reliable there than elsewhere. Residents of the elite sector tend to avoid living near sectors that may be noisy or polluting or that cater to people with limited incomes.



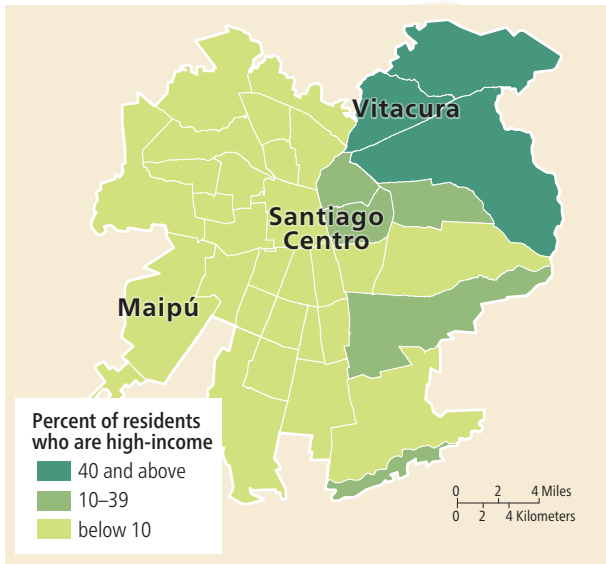
▲ **FIGURE 13-46 SECTOR MODEL APPLIED TO CITIES IN DEVELOPING COUNTRIES** Ernest Griffin and Larry Ford's model of a Latin American city.

Multiple Nuclei in Developing Countries

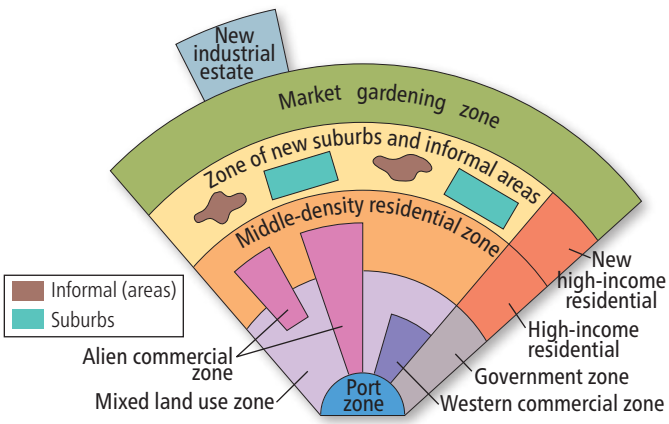
Urban geographer and social scientist Terry McGee constructed a model of a Southeast Asian city that superimposes on concentric zones several nodes of informal settlements and what he called "alien" zones, where newcomers live and work (Figure 13-48). McGee found that Southeast Asian cities do not typically have a strong CBD. Instead, the various functions of the CBD are dispersed to several nodes.

Cities in some developing countries show evidence of the multiple nuclei model by containing a complex mix of ethnic groups. During South Africa's apartheid era (refer to Chapter 7), its cities showed especially clear evidence of the multiple nuclei because Black, Coloured, White, and Asian South Africans were forced by law to segregate into distinct neighborhoods (Figure 13-49 and refer to Figures 7-31 and 7-32).

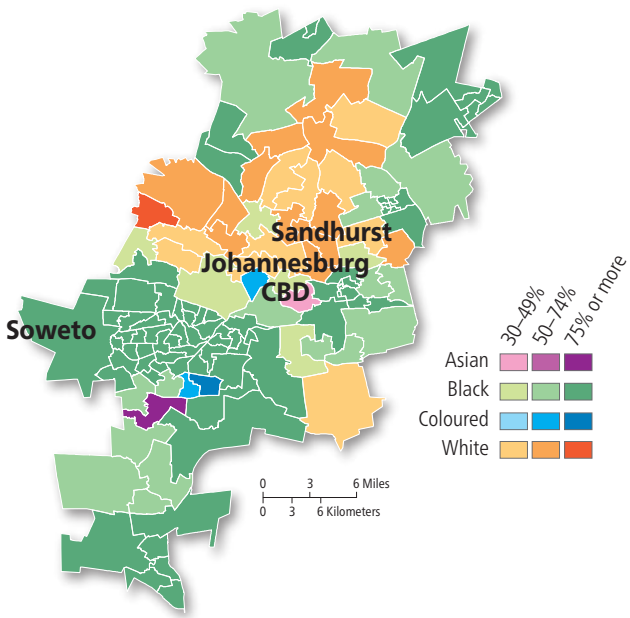
Pause & Reflect 13.3.2 Would you expect the distribution of people with college degrees to follow most closely the concentric zone, sector, or multiple nuclei model? Why?



▲ **FIGURE 13-47 SECTORS IN SANTIAGO, CHILE** People of high-income tend to live in a sector to the northeast, including Vitacura commune, whereas people of low-income tend to live in a southwest sector, including Maipú commune.



▲ **FIGURE 13-48 MULTIPLE NUCLEI MODEL APPLIED TO CITIES IN DEVELOPING COUNTRIES** Terry McGee's model of a Southeast Asian city.



▶ **FIGURE 13-49 MULTIPLE NUCLEI IN JOHANNESBURG, SOUTH AFRICA** White South Africans tend to live in neighborhoods to the northeast, such as Sandhurst, whereas Black South Africans tend to live to the southwest, including Soweto.

Applying the Urban Models to Mexico City

Learning Outcome 13.3.3 Describe stages of development and apply urban models to Mexico City.

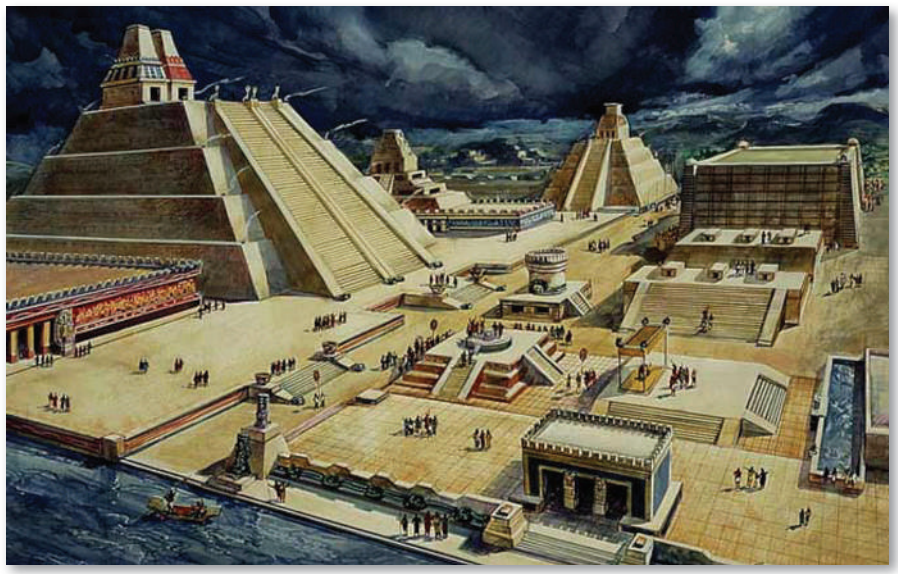
Mexico City provides a good example of a city in a developing country that has passed through three stages of development: pre-European origin, the European colonial period, and postcolonial independence. The modern city also displays evidence of the models of urban structure.

▲ **FIGURE 13-50 PRECOLONIAL MEXICO CITY SITE AND SITUATION** The Aztec city of Tenochtitlán was built on an island in Lake Texcoco. This is a portion of a mural in Mexico City's National Palace painted by Diego Rivera.

Precolonial Mexico City

The Aztecs founded Mexico City—which they called Tenochtitlán—on a hill known as Chapultepec ("the hill of the grasshopper"). When forced by others to leave the hill, they migrated a few kilometers south, near the present-day site of the University of Mexico, and then in 1325 to a marshy 10-square-kilometer island in Lake Texcoco (Figure 13-50).

The node of religious life was the Great Temple (Figure 13-51). Three causeways with drawbridges linked Tenochtitlán to the mainland and also helped control flooding. An aqueduct brought fresh water from Chapultepec. Most food, merchandise, and building materials crossed from the mainland to the island by boat, and the island was laced with canals to facilitate movement. Over the next two centuries, the Aztecs conquered the neighboring peoples and extended their control through much of present-day Mexico. As their wealth and power grew, Tenochtitlán grew to a population of between 200,000 and 400,000 inhabitants.



▲ **FIGURE 13-51 PRECOLONIAL MEXICO CITY CBD** The center of Tenochtitlán was dominated by the Templo Mayor (called Huēyi Teōcalli by the Aztecs). The twin shrines on the top of the temple were dedicated to the Aztec god of rain and agriculture (in blue) and to the Aztec god of war (red). This is part of a reconstruction made in the 1990s.

Colonial Mexico City

The Spanish conquered Tenochtitlán in 1521 after a two-year siege. They destroyed Tenochtitlán, dispersed or killed most of the inhabitants, and constructed a new city on the site. As in other colonial cities, the Spanish built Mexico City around a main square, called the Zócalo, on the site of the Aztecs' sacred precinct in the center of the island. Streets were laid out in a grid pattern extending from the Zócalo (Figure 13-52).

Pause & Reflect 13.3.3 How did the Spanish change precolonial Tenochtitlán to create colonial Mexico City? Why might contemporary Mexicans wish to excavate and explore the ruins?

▲ **FIGURE 13-52 COLONIAL MEXICO CITY** The main square in downtown Mexico City, the Zócalo, was laid out by the Spanish. The Metropolitan Cathedral is to the left. The National Palace is at the far end of the square. Excavations at the site of the Templo Mayor are to the left of the National Palace and behind the Metropolitan Cathedral.

Modern Mexico City

At independence, Mexico City was a relatively small city. The population grew modestly during the nineteenth century, reaching around 500,000 in 1900. Currently, the population of the municipality of Mexico City is 9 million, and the population of the urban area is 22 million.

Concentric Zones in Mexico City. Millions of people have migrated to Mexico City in search of work. Rapid population growth has resulted in an expansion of the land area of Mexico City.

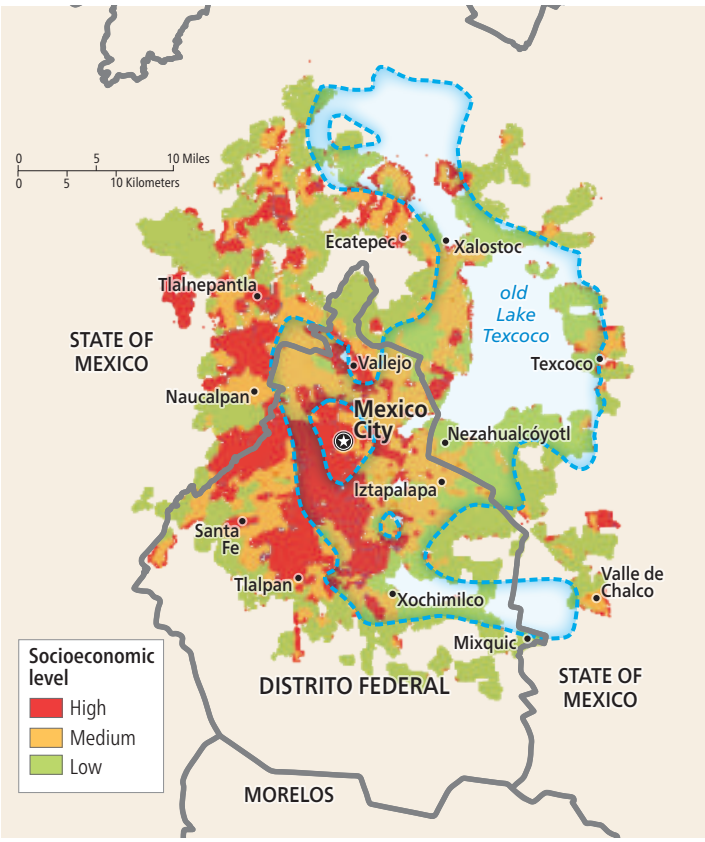
Like many urban areas in developing countries, the character of Mexico City's concentric zones differs from that of the United States. In Mexico City, the outer ring contains the most modest and least expensive housing. The high cost of housing near the center of the city has forced people with limited incomes to live in informal settlements on the outskirts of the city. Many of these informal settlements are located on hillsides (Figure 13-53). Residents of the hillside informal settlements have difficulty reaching jobs that are concentrated in the CBD and inner rings of Mexico City.

Sectors in Mexico City. Mexico City's sector with the most expensive housing, where people on the higher end of the socioeconomic scale live, is toward the southwest, along the Paseo de la Reforma, a wide tree-lined boulevard designed by Emperor Maximilian (1864–1867) and patterned after the Champs-Elysées in Paris (Figure 13-54). The Reforma between downtown and Chapultepec became the spine of the expensive sector. During the late nineteenth century, elaborate palacios (palaces) were built along the Reforma. More recently, high-rise apartments and offices have been built there (Figure 13-55).

Physical factors also influenced the movement of people with relatively high incomes toward the west, along the Reforma. Because elevation was higher than elsewhere in the city, sewage flowed eastward and northward, away from Chapultepec. In 1903, most of Lake Texcoco was drained by a gigantic canal and tunnel project, allowing the city to expand to the north and east. The dried-up lake bed is a less desirable residential location than the west side because prevailing winds from the northeast stir up dust storms. As Mexico City's population grew rapidly during the twentieth century, the social patterns inherited from the nineteenth century were reinforced.

▲ **FIGURE 13-53 CONCENTRIC ZONES IN MEXICO CITY** Housing for people with limited incomes is built into hillsides in outer rings.

▼ **FIGURE 13-54 SOCIAL AREAS IN MEXICO CITY**



▼ **FIGURE 13-55 EXPENSIVE SECTOR IN MEXICO CITY** The Paseo de la Reforma is the main boulevard through the heart of the high-end sector.

KEY ISSUE

13.4 | Why Might Urban Settlements Be More Sustainable?

Contemporary cities display ever-sharper contrasts. Some cities are thriving while others struggle. Some neighborhoods are animated while others are depopulated.

Urban Transportation

Learning Outcome 13.4.1 Describe the impact of motor vehicles in urban areas.

The average American travels 56 kilometers (35 miles) per day. People do not travel aimlessly; their trips have a precise point of origin, destination, and purpose. In the United States, 19 percent of trips are for work, 28 percent for social and recreational activities, 18 percent for shopping, 20 percent for other personal errands, 11 percent for school or church, and 4 percent for other purposes.

Transportation Epochs

Transportation improvements have played a key role in the changing structure of urban areas. Geographer John Borchert identified five epochs of U.S. urban areas resulting from changing transportation systems (Figure 13-56): the Sail-Wagon Epoch (1790–1830), the Iron Horse Epoch (1830–1870), the Steel Rail Epoch (1870–1920), the Auto-Air-Amenity Epoch (1920–1970), and the Satellite-Electronic-Jet Propulsion (1970–?).

Cities have prospered or suffered during the various epochs, depending on their proximity to economically important resources and migration patterns. At the same time, cities retain physical features from the earlier eras that may be assets or liabilities in subsequent eras.

Benefits & Costs of Motor Vehicles

In the United States, most trips are by motor vehicle, even in urban areas where buses and trains may be available. Overall, 83 percent of all trips made by Americans are by private vehicle, 10 percent are by walking, 3 percent are by public transport, and 4 percent are by other means. Even in metropolitan areas with more than 3 million people, 75 percent of all trips are made by private vehicle. There are 1.4 billion motor vehicles in the world, including 291 million in the United States. The United States actually has more registered motor vehicles than licensed drivers.

Motor vehicles offer two principal benefits:

- **Comfort, choice, & flexibility.** Motorists can live wherever they wish and travel whenever they wish. They are not constrained by the timetable of public transport service. A motor vehicle offers comfortable seats, choice of music, and isolation from strangers on a bus or subway.
- **Perceived cost.** Motorists perceive that the cost of using vehicles is less than the cost of using public transport. Each time public transport is used a fare must be paid, and the fare is higher than the cost of fuel, at least in the United States. Most of the costs associated with motor vehicles, such as insurance and license, are paid on an annual basis, regardless of the amount of driving that is actually done.

Motor vehicles incur environmental costs beyond their purchase and operation. These environmental costs are rarely noticed by motorists. The motor vehicle is an important user of land in the city. An average city allocates about one-fourth of its land to roads and parking lots. Multilane freeways cut a 23-meter (75-foot) path through the heart of a city, and elaborate interchanges consume even more space. Valuable land in the central city is devoted to parking cars and trucks, although expansive underground and multistory parking structures can reduce the amount of ground-level space needed. European and Japanese cities have been especially disrupted by attempts to insert new roads and parking areas in or near the medieval central areas.

▼ FIGURE 13-56 TRANSPORTATION EPOCHS

1800

SAIL-WAGON EPOCH (1790–1830)

Urban areas were clustered along the Atlantic Coast. Communication was primarily by wind-powered ships plying up along the Atlantic Coast.

1850

IRON HORSE EPOCH (1830–1870)

Steam-powered railroads provided transport from outlying areas into cities. Canals connected newly founded inland cities with existing urban centers on the East Coast.

1900

STEEL RAIL EPOCH (1870–1920)

Long-haul rail lines connected urban areas around the country. Travel time between cities was greatly reduced.

1950

AUTO-AIR-AMENITY EPOCH (1920–1970)

The gasoline engine made it possible for motor vehicles to become the dominant transport within and between urban areas. Gasoline-powered airplanes facilitated travel between distant urban centers.

2000

SATELLITE-ELECTRONIC-JET PROPULSION EPOCH (1970–?)

The current era is characterized by the ability to communicate electronically, as well as to control transport systems electronically.

Controlling Vehicles

The future health of urban areas depends on relieving traffic congestion. Some cities have demolished freeways that once sliced through CBDs, including Boston, San Francisco, and Seoul. For example, Boston's Central Artery has been replaced by a park (Figure 13-57).

Geographic tools, including the Global Positioning System (GPS) and electronic mapping, are playing central roles in the design of intelligent transportation systems, either through increasing road capacity or through reducing demand. The current generation of innovative techniques to increase road capacity is aimed at providing drivers with information so that they can make intelligent decisions about avoiding congestion. Information about traffic congestion is transmitted through computers, handheld devices, and vehicle monitors. Traffic hot spots are displayed on electronic maps and images, using information collected through sensors in the roadbeds and motorists' phones. An individual wishing to know about a particular route can program an electronic device to receive a congestion alert and to suggest alternatives. Radio stations in urban areas broadcast reports to advise motorists of accidents or especially congested highways.

Demand to use congested roads is being reduced in a number of ways:

- **Congestion charges.** To help reduce pollution as well as congestion, motorists must pay a charge of £12.50 ($15) to drive in an area around central London designated as an *ultra low emission zone*. Motorists must also pay a congestion charge of £15 ($18) to drive into the central area between 7 a.m. and 6 p.m. Monday through Friday (Figure 13-58). A similar system exists in Stockholm, where the charge varies depending on the time of day.
- **High-occupancy vehicle lanes (HOVs).** Freeway lanes are restricted to vehicles with more than one occupant. An HOV is designed to reduce the number of vehicles using a freeway by encouraging several people to share a ride instead of driving Individually. An HOV is sometimes called a carpool lane.
- **Tolls.** In many urban areas, motorists are charged higher tolls to drive on freeways during congested times than at other times. A transponder attached to a vehicle records the time of day it is on the highway. A monthly bill sent to the vehicle's owner reflects the differential tolls.
- **Permits.** In some cities, motorists are allowed to drive into central areas only on certain days. For example, in Jakarta a vehicle with a license plate ending in an even number would be permitted in the central area on even-numbered days and prohibited on odd-numbered days. Restrictions based on license-plate numbers are especially common in Latin American cities.
- **Bans.** Cars are banned from portions of the central areas of a number of European cities, including Amsterdam, Brussels, Copenhagen, Ljubljana, Madrid, Oslo, and Vienna.

▲ **FIGURE 13-58 CONGESTION CHARGE ZONE, LONDON**

Pause & Reflect 13.4.1 If you had to pay $33 to drive into the center of a city like London, would you pay it, look for other options, or choose not to go into the central city at all? Why?

(a)

(b)

▲ **FIGURE 13-57 FREEWAY DEMOLITION** Boston's Central Artery freeway was demolished and replaced with an underground freeway and the Rose Kennedy Greenway. (a) Central Artery in 1990; (b) Rose Kennedy Greenway and underground freeway entrance.

Legacy of Public Transport

Learning Outcome 13.4.2 Describe the benefits and drawbacks of public transport.

In urban areas, public transport is better suited than motor vehicles to moving large numbers of people because each transit traveler takes up far less space. Public transport is cheaper, less polluting, and more energy efficient than privately operated motor vehicles. It also is particularly suited to rapidly bringing a large number of people into a small area. A bus can accommodate 30 people in the amount of space occupied by one car, whereas a double-track rapid transit line can transport the same number of people as 16 lanes of urban freeway. Despite the small number of trips by public transport, the mode of travel is an important component of transportation systems in large cities.

Because few people live within walking distance of their place of employment, urban areas are characterized by extensive commuting. The heaviest flow of commuters is into the CBD in the morning and out of it in the evening. **Rush hour**, or peak hour, is the four consecutive 15-minute periods that have the heaviest traffic. The intense concentration of people in the CBD during working hours strains transportation systems because a large number of people must reach a small area of land at the same time in the morning and disperse at the same time in the afternoon. As much as 40 percent of all trips made into or out of a CBD occur during four hours of the day – two in the morning and two in the afternoon.

Public Transit Around the World

Public transit is classified as heavy rail, light rail, and bus. Heavy rail includes underground subways, metros, and elevated trains. Light rail includes trams and streetcars. In hundreds of cities around the world, extensive networks of public transit lines have been maintained, and funds for new construction have been provided in recent years. Heavy-rail systems were in operation in 205 cities around the world as of 2022, including 10 opened since 2020 (Figure 13-59).

▼ **FIGURE 13-59 HANOI, VIETNAM, METRO, OPENED IN 2021**

The greater importance placed on public transport outside the United States can be seen by comparing Indianapolis, Indiana, with Munich, Germany. Both urban areas have around 1.5 million inhabitants, and both have around 500 kilometers of bus lines. But Indianapolis has no rail service, whereas Munich has 103 kilometers of U-Bahn (underground heavy rail), 530 kilometers of S-Bahn (elevated heavy rail), and 79 kilometers of trams (Figure 13-60). Munich's first U-Bahn line opened in 1971, and the city's first S-Bahn line opened a year later. They provided improved transportation for the 1972 Olympics, which Munich hosted. Indianapolis's last streetcars stopped running in 1953.

Pause & Reflect 13.4.2 Do you regularly utilize public transport? Why or why not?

(a)

(b)

(c)

▲ **FIGURE 13-60 MUNICH PUBLIC TRANSIT OPTIONS** (a) U-Bahn underground heavy rail; (b) S-Bahn elevated heavy rail; (c) tram.

Public Transport in the United States

The expansion of U.S. cities was constrained in the nineteenth century by poor transportation. People lived in crowded cities because they had to be within walking distance of shops and places of employment. Horse-drawn trams and buses were ineffective because the intense congestion prevented them from moving any faster than a pedestrian. Into the twentieth century to relieve congestion, the largest U.S. cities built subways and elevated train lines, especially after they could be operated with electricity rather than steam- or horse-power.

By the late nineteenth century, so-called streetcar suburbs developed outside some U.S. cities. People could live in a suburban house and commute to the CBD by rail. Some of these streetcar suburbs still exist and retain unique visual identities. They consist of houses and shops clustered near a station or former streetcar stop at a much higher density than is found in newer suburbs.

The suburban explosion in the twentieth century relied on motor vehicles rather than railroads, especially in the United States. Rail lines had restricted nineteenth-century suburban development to narrow ribbons within walking distance of the stations. Cars and trucks permitted large-scale development of suburbs at greater distances from the center, in the gaps between the rail lines. Motor vehicle drivers had much greater flexibility in their choice of residence than was ever before possible.

Recent Trends in Public Transport. Public transport in the United States is used primarily for commuting by workers into and out of the CBD. Despite its advantages in getting in and out of the CBD, public transport is used for only 5 percent of commuting trips in the United States. One-half of trips to work are by public transport in New York; one-third in Boston, San Francisco, and Washington; and one-fourth in Chicago and Philadelphia (Figure 13-61). But in most other cities, public transport service is minimal or nonexistent.

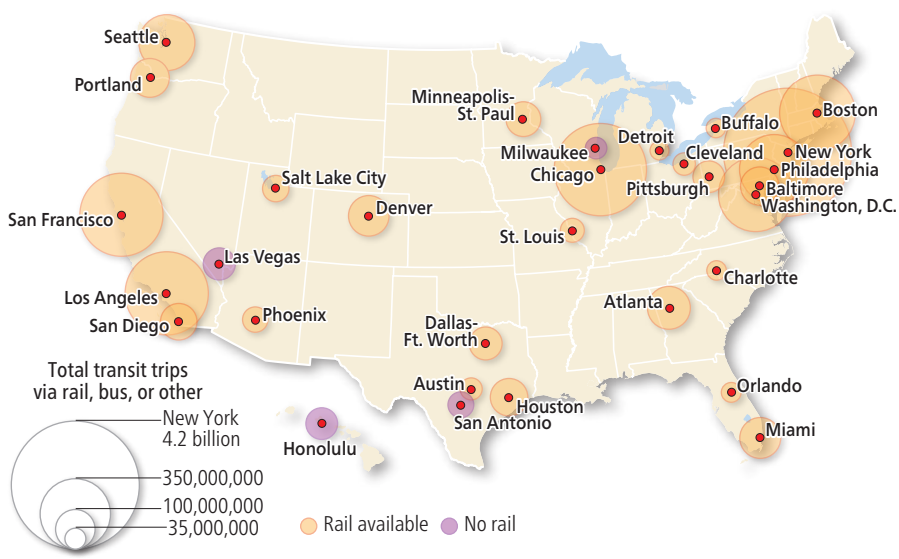
Light-rail transit was once relegated almost exclusively to tourist attractions in New Orleans and San Francisco but is making a comeback in North America. The United States has 37 light-rail systems, including 18 opened since 2000. Dallas and Los Angeles—long dependent entirely on motor vehicles—opened light-rail lines during the 1990s and now have the two largest U.S. systems, around 150 kilometers (95 miles) each.

Fourteen U.S. cities have subway systems, including six that were opened between 1972 and 1993 in Atlanta, Baltimore, Los Angeles, Miami, San Francisco, and Washington. Cities with century-old systems such as Boston and Chicago have attracted new passengers through construction of new lines and modernization of existing ones. Chicago has pioneered construction of heavy-rail rapid transit lines in the median strips of expressways. The federal government has permitted Boston, New York, and other cities to use funds originally allocated for interstate highways to modernize rapid transit service instead. New York's subway cars, once covered with graffiti, were cleaned so that passengers can ride in a more hospitable environment, although graffiti is increasing again.

Challenges Facing Public Transit. Despite modest recent successes, public transit in the United States is caught in a vicious circle because fares do not cover operating costs. As patronage declines and expenses rise, the fares are increased, which drives away passengers and leads to service reduction and still higher fares. Public expenditures to subsidize construction and operating costs have increased, but the United States does not fully recognize that public transportation is a vital utility deserving of subsidy to the degree long assumed by governments in other developed countries, as well as developing countries.

The minimal level of public transit service in most U.S. cities means that some people are unable to reach places of employment. People of modest means and fewer years of education are more likely to live in inner-city neighborhoods, but job opportunities in personal services that require minimal training and skill are mostly in suburban areas not well served by public transportation. Inner-city neighborhoods have high unemployment rates at the same time that suburban firms have difficulty attracting workers.

Public transport reached its peak in the United States in the 1940s, when it carried 23 billion passengers per year. Ridership in the United States declined to a low of around 6 billion in 1970. Public transport ridership increased to 10 billion in 2019 but decreased to under 5 billion in 2020 as a result of the COVID-19 lockdown. Since the lifting of the lockdown, public transport ridership has remained far below the pre-pandemic level. In New York City, for example, ridership declined from 3.5 billion in 2019 to 1.5 billion in 2020 and increased only modestly in 2021 to 1.7 billion. As places of employment reopened, many people worked full-time or part-time at home.



▲ **FIGURE 13-61 PUBLIC TRANSIT PASSENGERS IN U.S. CITIES**

Challenges & Hopes for Cities

Learning Outcome 13.4.3 Summarize social challenges and improvements experienced by many cities.

One hundred years ago, inner-city neighborhoods in the United States teemed with throngs of recent immigrants from Europe. Such neighborhoods that housed perhaps 100,000 a century ago may contain fewer than 5,000 inhabitants today. Those remaining in these neighborhoods face a variety of distinctive social and physical challenges that are very different from those faced by suburban residents.

The City Challenged

Residents of inner-city neighborhoods face multiple challenges. They have distinctive obstacles in finding jobs, being safe, and obtaining services.

Job Skills. Residents of inner-city neighborhoods are increasingly disadvantaged in competing for jobs. Because fewer than half complete high school, they may lack technical training needed for jobs in factories that now require skills in operating electronics. Businesses that are willing to hire people with relatively modest skills, such as cleaning services and fast-food restaurants, are mostly located in suburbs. But many people living in inner-city neighborhoods have difficulty reaching suburban jobs because they don't own cars.

Homelessness. Around 570,000 Americans live in homelessness, according to the U.S. Department of Housing and Urban Development. The principal cause of homelessness is insufficient income to afford housing. Affordable housing is increasingly difficult to find in inner cities. Homelessness may have been sparked by family problems or job loss. One-fourth of those living without homes are children, according to government surveys.

▲ **FIGURE 13-62 INNER-CITY FOOD INSECURITY** Feeding those in need, Los Angeles.

Challenges for Families. Unwed mothers give birth to more than one-half of the babies in U.S. inner-city neighborhoods, and more than one-half of children in U.S. inner cities live with only one parent. Because of inadequate child-care services, single mothers may be forced to choose between working to generate income and staying at home to take care of their children. If the father or a partner moves back home, the mother may lose government assistance and other benefits, leaving the couple financially worse off together than apart.

Challenges to Health & Safety. Inner-city neighborhoods have a relatively high share of a metropolitan area's serious crimes, such as murder. Elevated crime rates in an inner-city neighborhood may reflect the neighborhood's high rates of joblessness and drug addiction. For example, some drug users obtain money through criminal activities. Gangs may form in inner-city neighborhoods to control lucrative drug distribution. Violence may erupt when two gangs fight over the boundaries between their drug distribution areas. Although drug use is increasing more rapidly in rural areas, inner cities still have higher rates of use. Heroin and cocaine use is especially higher in cities compared to rural areas.

Services. Inner-city neighborhoods lack adequate police and fire protection, shops, hospitals, clinics, and other health-care facilities. Access to food is an especially common challenge in the areas where residents with low incomes dwell (Figure 13-62). Residents with low incomes need the same range of public services as residents with moderate and high incomes. However, cities face a growing gap between the cost of needed services and the availability of funds to pay for them.

Congestion. The average American wasted 22 gallons of gasoline and lost 54 hours per year sitting in traffic jams in 2019, according to the Urban Mobility Report prepared by the Texas Transportation Institute. In the United States, the total cost of congestion is valued at $190 billion per year. In 2020, when many businesses and schools were closed at the height of the COVID-19 pandemic, all of the numbers were cut in half. But Americans returned to work and schools in 2021, and with that came an increase in congestion costs. Most Americans overlook these costs because they prefer to commute by vehicle and they place a higher value on the privacy and flexibility of schedule offered by a car.

The use of motor vehicles is supported by policies that keep the price of fuel below the level found in Europe. The U.S. government also encourages the use of cars and trucks by paying 90 percent of the cost of limited-access, high-speed interstate highways, which stretch for 78,000 kilometers (49,000 miles) across the country.

Pause & Reflect 13.4.3 How might additional investment in education address some of the challenges experienced by those living in cities?

The City Renewed

The process of converting an urban neighborhood from a predominantly low-income, renter-occupied area to a predominantly middle-income, owner-occupied area is called **gentrification**. Most cities have at least one substantially renovated inner-city neighborhood that has attracted higher-income residents, especially single people and couples without children who are not concerned with the quality of inner-city schools (Figure 13-63).

Reviving Residential Areas. Gentrification of a deteriorated inner-city neighborhood is attractive for several reasons:

- Inner-city houses may be larger and more substantially constructed yet less expensive than houses in the suburbs.
- Inner-city houses may possess attractive architectural details, such as ornate fireplaces, cornices, high ceilings, and wood trim.
- Inner-city living eliminates the strain of commuting on crowded freeways or public transport for people who work downtown.
- Inner-city neighborhoods are near theaters, bars, restaurants, stadiums, and other cultural and recreational facilities.

Because renovating an old inner-city house can be even more expensive than buying a new one in the suburbs, cities encourage the process by providing low-cost loans and tax breaks. Public expenditures for renovation have been criticized as subsidies for the middle class at the expense of people with lower incomes, who are sometimes forced to move out of the gentrified neighborhoods because the rents in the area suddenly become too high for them.

(a)

(b)

▲ **FIGURE 13-63 GENTRIFICATION IN CINCINNATI** (a) Into the twenty-first century, the inner-city neighborhood of Over-the-Rhine had many abandoned residences and shops. (b) Many of these buildings have been renovated with attractive shops and higher-cost housing.

◀ **FIGURE 13-64 FANEUIL HALL, BOSTON** The market was established in 1893 in a railroad station. The market declined with the rise of suburbs in mid-twentieth century. In the twenty-first century, the market has been revitalized to attract office workers and tourists as well as people with high incomes living in nearby gentrified neighborhoods.

Reviving Consumer Services. Most consumer services have located in suburbs to be near suburban residents. However, some consumer services are returning to the inner city, in part to meet day-to-day needs of residents of gentrified neighborhoods. Inner-city consumer services are also attracting people looking for leisure activities, such as unusual shops in a dramatic downtown setting or view of a harbor. Several North American CBDs have combined new retail services with leisure services. For example:

- Boston's Faneuil Hall Marketplace is located in renovated eighteenth-century buildings (Figure 13-64).
- Baltimore's Harbor Place is built in the Inner Harbor, adjacent to waterfront museums, tourist attractions, hotels, and cultural facilities.
- Chicago's Navy Pier, a former cargo dock, has been converted to shops and attractions.
- New York's South Street Seaport integrates the old fish market with retailing and recreational activities.
- Philadelphia's nineteenth-century Reading Terminal Market, which barely survived during the twentieth-century suburbanization movement, has been renovated into a thriving marketplace with individual stalls operated by different merchants.
- San Francisco's Ferry Building, where San Francisco Bay ferries dock, is a gourmet food center.

Challenges for Suburbs

Learning Outcome 13.4.4 Explain ways in which suburbs are segregated.

Most Americans live in suburban communities. Suburbs face distinctive geographic challenges stemming from patterns of segregation. Two forms of segregation are especially significant in suburbs:

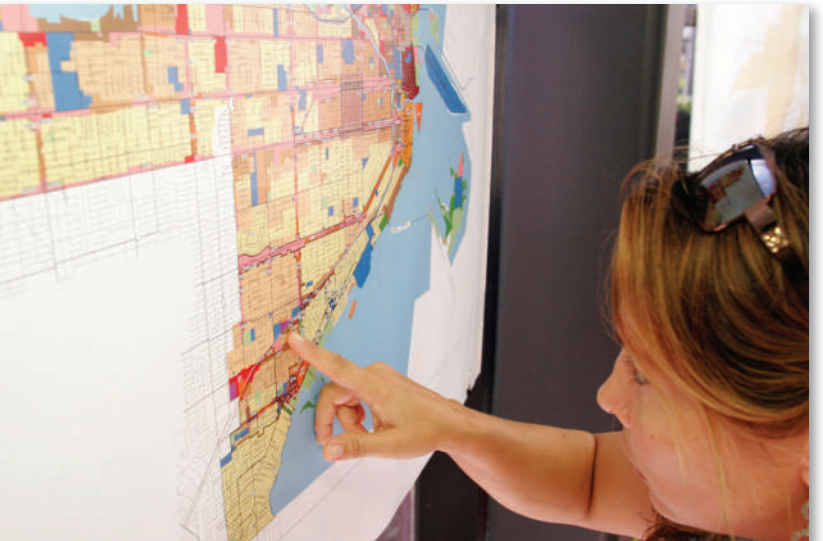
- **Residential segregation.** Housing in a given suburban community is usually built for people of a particular income level, with others excluded by virtue of the cost, size, or location of the housing. Segregation by race and ethnicity also persists in some suburbs (see Chapter 7).
- **Commercial segregation.** Residents of suburbs are separated from commercial and manufacturing activities that are confined to compact, distinct areas.

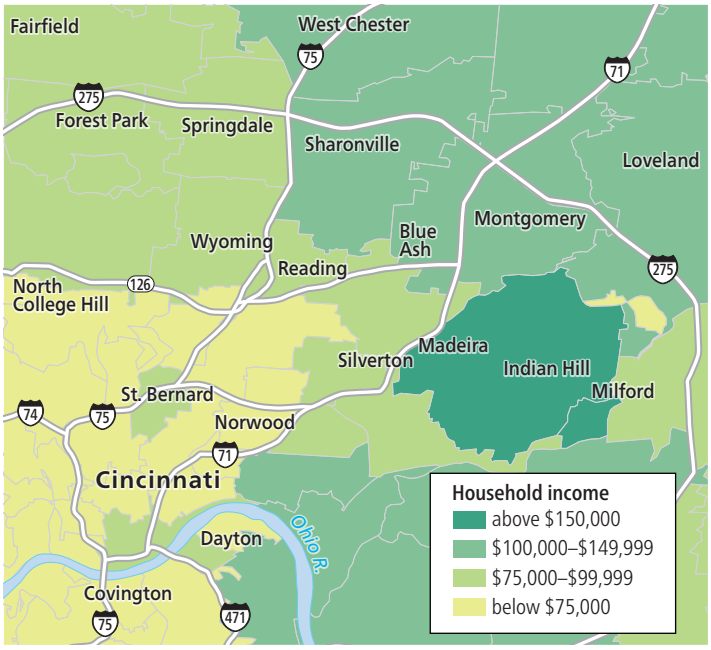
Residential Segregation

People with limited incomes are less likely to live in many U.S. suburbs because of the high cost of the housing, and Black people may face unwelcoming attitudes of white people already residing in a suburban community. Suburban communities discourage the entry of those with lower incomes and people of color because of fear that property values will decline if the composition of the neighborhood is altered. Extensive areas of suburbs have been developed with houses of similar interior dimension, lot size, and cost, appealing to people with similar incomes and lifestyles.

The homogeneity in suburban communities is legally protected through zoning ordinances. A **zoning ordinance** is a law that limits the permitted uses of land and maximum density of development in a community. Zoning ordinances typically identify districts designed only for single-family houses, apartments, industry, or commerce (Figure 13-65). Families with low incomes may have difficulty finding affordable housing through provisions such as requiring each house to sit on a large lot and prohibiting apartments. Fences are built around some suburban housing districts, and visitors must check in at a gatehouse to enter.

▼ **FIGURE 13-65 ZONING ORDINANCE, MIAMI, FLORIDA**





▲ **FIGURE 13-66 MEDIAN INCOME, CINCINNATI SUBURBS** The Village of Indian Hill has a median household income of around $190,000, much higher than neighboring suburbs. White people comprise 84 percent of Indian Hill's population, compared with 12 percent Asian American, 2 percent Black people, and 2 percent two or more races. Hispanic Americans comprised only 2 percent of Indian Hill's population. According to Claritas, the three clusters most prevalent in Indian Hill are *Winner's Circle* (35- to 54-year-old couples, with several children and high incomes, who enjoy traveling and new experiences); *Gray Power* (couples over age 65 with high incomes and without children at home); and *Movers & Shakers* (45- and 64-year-old couples with high incomes and without children, employed as executives and other professional occupations).

In an attempt to reduce segregation, California now allows property owners to build houses on smaller (and therefore less expensive) lots. Zoning ordinances that once permitted only one house on a lot now automatically entitle property owners to build up to four houses on the same property.

Marketing geographers identify sectors, rings, and nodes that come closest to matching customers preferred by a retailer. Companies use this information to understand, locate, and reach their customers better and to determine where to put new stores and where advertising should appear.

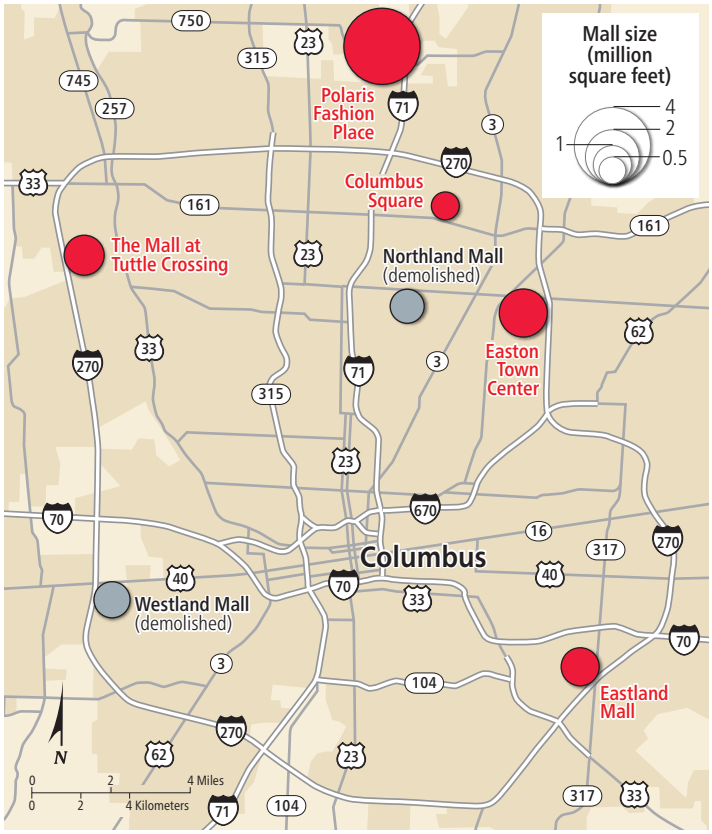
Segmentation is the process of partitioning markets into groups of potential customers with similar needs and characteristics who are likely to exhibit similar purchasing behavior. A prominent example of geographic segmentation is the Potential Rating Index for Zip Markets (PRIZM) clusters created by the global marketing research firm Claritas. As Claritas states, "birds of a feather flock together" – in other words, people who are similar are likely to live near one another.

Claritas combines two types of geographic information: distribution of the social and economic characteristics of people obtained from the census and the addresses of purchasers of various products obtained from service providers. The variables are organized into 68 clusters that are given picturesque names, such as *Lo-Tech Singles* and *Domestic Duos*. For each ZIP code in the United States, Claritas determines the clusters that are most prevalent. Claritas calls this analysis "you are where you live" (Figure 13-66).

Suburban Consumer Services

Consumer and business services are also expanding in suburbs. A number of factors account for this trend. Consumer services have expanded in the suburbs because most of their customers live there (Figure 13-67). Historically, urban residents bought food and other daily necessities at small neighborhood shops in the midst of housing areas and shopped in the CBD for other products. But since the end of World War II, most CBD shops have closed (except for those attracting downtown office workers), whereas suburban sales have increased. Larger malls, strategically situated near beltway exits and surrounded by extensive parking lots, contain department stores and specialty shops once located only in the CBD. A shopping mall is built by a developer, who buys the land, builds the structures, and leases space to individual merchants (Figure 13-68).

In recent years, shopping malls have begun to lose customers. The rise of online consumer services, such as Amazon, has taken away from mall traffic, especially after the start of the COVID-19 pandemic. A number of malls have closed (refer to Figure 13-67).



▲ **FIGURE 13-67 SUBURBAN SHOPPING MALLS, COLUMBUS, OHIO** The malls surround the city near the beltway. Northland Mall and Westland Mall are examples of malls that have closed.

Pause & Reflect 13.4.4 Are you able to walk from your home to consumer services? Would you want to live near shops? Why or why not?

Suburban Business Services

Offices that do not require face-to-face contact are increasingly moving to suburbs, where rents are lower than in the CBD. Executives can drive more easily to their offices and park their cars without charge. Factories and warehouses also increasingly locate in suburbs for more space, cheaper land, and better truck access.

Suburban locations have posed hardships for some employees, especially lower-paid workers, such as administrative assistants and custodians. These employees may live in neighborhoods that are not convenient to where they work. They may not own reliable cars, and public transportation may not serve their place of employment. Some workers miss the stimulation and animation of a central location, particularly at lunchtime.

▼ **FIGURE 13-68 SUBURBAN SHOPPING MALL** Easton Town Center, in a Columbus, Ohio, suburb, is a shopping mall designed to look like a CBD.

Suburban Sprawl & Smart Growth

Learning Outcome 13.4.5 Describe suburban sprawl and alternatives to sprawl.

When private developers select new housing sites, they seek cheap land that can easily be prepared for construction. This land is often not contiguous to the existing built-up area. **Sprawl** is the development of suburbs at relatively low density and at locations that are not connected to the existing built-up area. Sprawl is also fostered by the desire of some families to own large tracts of land.

Land is not transformed immediately from farms to housing developments. Instead, developers buy farms for future construction of houses by individual builders. The peripheries of U.S. cities look like Swiss cheese, with pockets of development and gaps of open space (Figure 13-69).

Sprawl incurs costs:

- Local authorities must spend more money extending roads and utilities to connect developments not contiguous to existing built-up areas.
- More agricultural land is lost through construction of isolated housing developments. More energy is expended because trips to work and services must cover longer distances.

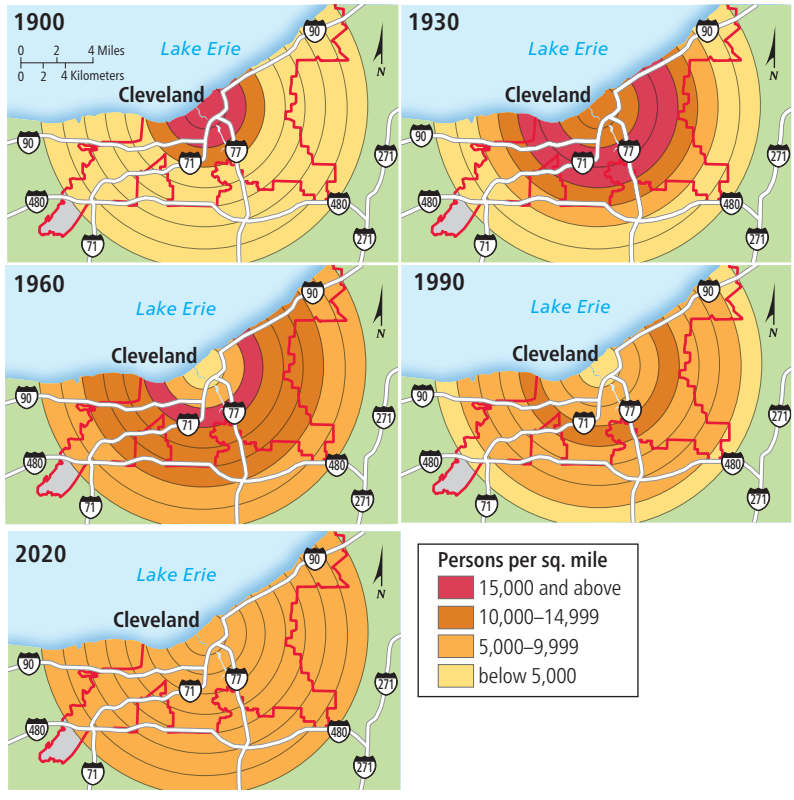
▲ **FIGURE 13-69 SUBURBAN SPRAWL** Albuquerque, New Mexico.

Density Gradient

As you travel outward from the center of a city, you can watch the decline in the density at which people live. Inner-city apartments or row houses may pack as many as 250 dwellings on a hectare of land (100 dwellings per acre). Older suburbs have larger row houses, semidetached houses, and individual houses on small lots, at a density of about 10 houses per hectare (4 houses per acre). A detached house typically sits on a lot of 0.25 to 0.5 hectares (0.6 to 1.2 acres) in new suburbs and a lot of 1 hectare or greater (2.5 acres) on the fringe of the built-up area.

This density change in an urban area is called the density gradient. According to the **density gradient**, the number of houses per unit of land diminishes as distance from the center city increases. Two changes have affected the density gradient in recent years (Figure 13-70):

- Fewer people living in the center. The density gradient thus has a gap in the center, where few live.
- Fewer differences in density within urban areas. The number of people living on a hectare of land has decreased in the central residential areas through population decline and abandonment of old housing. At the same time, density has increased on the periphery through construction of apartment, condominium, and town-house projects and diffusion of suburbs across a larger area.

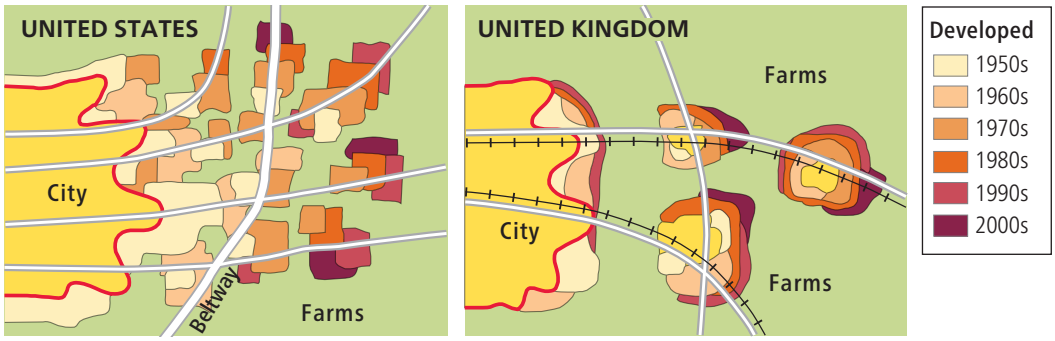


▲ **FIGURE 13-70 DENSITY GRADIENT IN CLEVELAND, 1900–2020** The red line shows the current City of Cleveland boundary.

These two changes flatten the density gradient and reduce the extremes of density between inner and outer areas traditionally found within cities.

U.S. & U.K. Suburbs

The supply of land for the construction of new housing is more severely restricted in European urban areas than in the United States. Officials try to limit sprawl by designating areas of mandatory open space. For example, several British cities are surrounded by greenbelts, or rings of open space (Figure 13-71). New housing is built either in older suburbs inside the greenbelts or in planned extensions to small towns and new towns beyond the greenbelts (Figure 13-72). On the other hand, restriction of the supply of land on the urban periphery has driven up house prices in Europe.



▲ **FIGURE 13-71 SUBURBAN DEVELOPMENT PATTERNS IN THE UNITED STATES AND THE UNITED KINGDOM.** (a) The United States has much more sprawl than the United Kingdom, through construction of discontinuous suburbs. (b) In the United Kingdom, new housing is more likely to be concentrated in new towns or planned extensions of existing towns.

▲ **FIGURE 13-72 HOUSING UNDER CONSTRUCTION, OUTSIDE LEEDS, UNITED KINGDOM**

Smart Growth

Several U.S. states and urban areas have taken steps to curb sprawl through smart growth. The Smart Growth Network defines **smart growth** as an approach to expanding urban areas in a manner that protects rural land for agriculture, recreation, and wildlife, by following ten development principles, including a mix of residential and commercial uses, a range of housing types, walkable neighborhoods, and compact design.

A key component of implementing a smart growth policy is the delineation of an **urban growth boundary** around an urban area. The states of Oregon, Washington and Tennessee require cities and counties to establish urban growth boundaries within which new development must occur (Figure 13-73). For example, Portland, Oregon, can annex only lands that have been included in the urban growth areas. A number of cities in other states also have urban growth boundaries. For example, Miami-Dade County, Florida, has an urban development boundary that limits expansion of the urban area into the Everglades.

Pause & Reflect 13.4.5 How might urban growth boundaries help slow suburban growth?

▶ **FIGURE 13-73 PORTLAND, OREGON, URBAN GROWTH BOUNDARY** New developments must take place inside the boundary.

13 Summary & Review

KEY ISSUE

13.1 | Why Are Urban Settlements Challenging to Define?

- Urban settlements are defined in various ways, including cities, urban areas, and metropolitan areas.
- Business, public, and some consumer services cluster in the CBD.
- North American CBDs are characterized by vertical features above and below ground.
- Cities are typically surrounded by sprawling, independent suburban jurisdictions.

KEY ISSUE

13.2 | Where Are People Distributed Within the Cities of Developed Countries?

- Four models—concentric zone, sector, multiple nuclei, and galactic—are used to described where people and activities are located within U.S. urban areas.
- When applied to European cities, the urban models display some similarities and some differences to the patterns found in U.S. cities.

KEY ISSUE

13.3 | Where Are People Distributed Within the Cities of Developing Countries?

- Cities in developing countries also show evidence of concentric zones, sectors, and multiple nuclei, although the distribution of social groups may vary from the patterns found in developed countries.
- Cities in developing countries are further influenced by colonial history.

KEY ISSUE

13.4 | Why Might Urban Settlements Be More Sustainable?

- Suburban residents depend on motor vehicles rather than public transit to get to most places.
- People living in inner cities may face challenges of access to jobs, family assistance, and services such as health care.
- Many cities have areas of gentrification and regeneration.
- Suburbs are often segregated by socioeconomic factors and by land use activities.

Thinking Geographically

KEY ISSUE

13.1 | Why Are Urban Settlements Challenging to Define?

Some professional sports stadiums and arenas are located in the CBD, and some are located in suburbs. What are the advantages and drawbacks for the fans of each location?

▲ **FIGURE 13CR-1 ORIOLE PARK AT CAMDEN YARDS IN BALTIMORE'S CBD**

KEY ISSUE

13.2 | Where Are People Distributed Within the Cities of Developed Countries?

Identify the ring, sector, and node in which you (or a friend or relation) live within an urban area. Do conditions in your place of residence fit the overall patterns expected of the urban structure models? Why or why not?

▲ **FIGURE 13CR-2 LAS VEGAS (BACKGROUND) CBD, (FOREGROUND) RESIDENTIAL AREA IN THE EAST SECTOR AND OUTER RING**

KEY ISSUE

13.3 | Where Are People Distributed Within the Cities of Developing Countries?

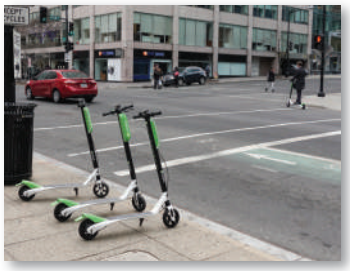
Efforts are underway to improve the condition of informal settlements, such as the free Medellín Metrocable, which connects informal settlements with Medellín's CBD. Why might the gondola be useful to residents of informal settlements?

▲ **FIGURE 13CR-3 MEDELLÍN, COLOMBIA, METROCABLE**

KEY ISSUE

13.4 | Why Might Urban Settlements Be More Sustainable?

Electric bikes and scooters are diffusing rapidly into cities. How might the diffusion of electric bikes and scooters alter transportation patterns in CBDs? What impact might they have in urban areas outside the CBD?



▲ **FIGURE 13CR-4 ELECTRIC SCOOTERS, WASHINGTON, D.C.**

Key Terms

Annexation Legally adding land area to a city in the United States.

Census tract An area delineated by the U.S. Bureau of the Census for which statistics are published; in urban areas, census tracts correspond roughly to neighborhoods.

Central business district (CBD) The area of a city where business, consumer, and public services are clustered.

Central city (see **municipality**).

Combined statistical area (CSA) In the United States, two or more contiguous core-based statistical areas tied together by commuting patterns.

Concentric zone model A model of the internal structure of cities in which social groups are spatially arranged in a series of rings.

Core-based statistical area (CBSA) In the United States, the collection of all metropolitan statistical areas and micropolitan statistical areas.

Density gradient The change in density in an urban area from the center to the periphery.

Edge city Node of office and retail activities on the edge of an urban area.

Galactic (or **peripheral) model** A model of North American urban areas consisting of an inner city surrounded by large suburban residential and business areas tied together by a beltway or ring road.

Gentrification A process of converting an urban neighborhood from a predominantly low-income, renter-occupied area to a predominantly middle-income, owner-occupied area.

Incorporated place (see **municipality**).

Informal settlement An area within a city in a developing country where housing has been built on land to which the occupants have no legal claim or has not been built to the city's standards for legal buildings.

Megalopolis A continuous urban complex, such as in the northeastern United States.

Metropolitan statistical area (MSA) In the United States, an urbanized area of at least 50,000 population, the county within which the city is located, and adjacent counties meeting one of several tests indicating a functional connection to the central city.

Micropolitan statistical area (μSA) An urbanized area of between 10,000 and 50,000 inhabitants, the county in which it is located, and adjacent counties tied to the city.

Multiple nuclei model A model of the internal structure of cities in which social groups are arranged around a collection of nodes of activities.

Municipality (or **incorporated place** or **central city)** An urban settlement that has been legally incorporated into an independent, self-governing unit.

Rush hour The four consecutive 15-minute periods in the morning and evening with the heaviest volumes of traffic.

Sector model A model of the internal structure of cities in which social groups are arranged around a series of sectors, or wedges, radiating out from the central business district.

Smart growth An approach to expanding urban areas in a manner that protects rural land for agriculture, recreation, and wildlife, by following ten development principles, including a mix of residential and commercial uses, a range of housing types, walkable neighborhoods, and compact design.

Social area analysis Statistical analysis used to identify where people of similar living standards, ethnic backgrounds, and lifestyles live within an urban area.

Sprawl Development of new housing sites at relatively low density and at locations that are not contiguous to the existing built-up area.

Suburb A residential or commercial area situated within an urban area but outside the central city.

Urban area A term to describe a central city in the United States and its surrounding built-up suburbs.

Urban cluster A term no longer used to describe an urban area in the United States with between 2,500 and 50,000 inhabitants.

Urban growth boundary Delineation of a boundary around an urban area within which new development must occur.

Urbanized area A term no longer used to describe an urban area in the United States with at least 50,000 inhabitants.

Zoning ordinance A law that limits the permitted uses of land and maximum density of development in a community.

International Geographic Mapping Explorations

Brasília: A Planned City

Brasília was planned in the 1950s as Brazil's new capital. The city was planned in the shape of an airplane. The plane's fuselage runs from the National Congress in the east, west along a linear park flanked by government offices. The plane's swept-back wings curve to the north and south.

▲ **FIGURE 13CR-5 AERIAL VIEW OF BRASÍLIA**

. . . . The patterns that geographers observe inside urban areas, such as sprawl and congestion, may contribute to the depletion and pollution of the world's natural resources. Alternatively, urban areas may help contribute to the preservation and conservation of the world's resources, as we will see in the next chapter, Resource Challenges. . . .

14 Resource Challenges

KEY ISSUES

14.1 Where Are Energy Resources Distributed?

Currently, energy is derived primarily from three fossil fuels: coal, natural gas, and petroleum. Neither the supply nor the demand for these resources is uniformly distributed.

14.2 Why Might We Rely More on Alternative Energy Sources?

Energy resources can be divided between renewable and nonrenewable. The three fossil fuels are nonrenewable, whereas other increasingly important energy resources are renewable.

14.3 Why Are Resources Being Polluted?

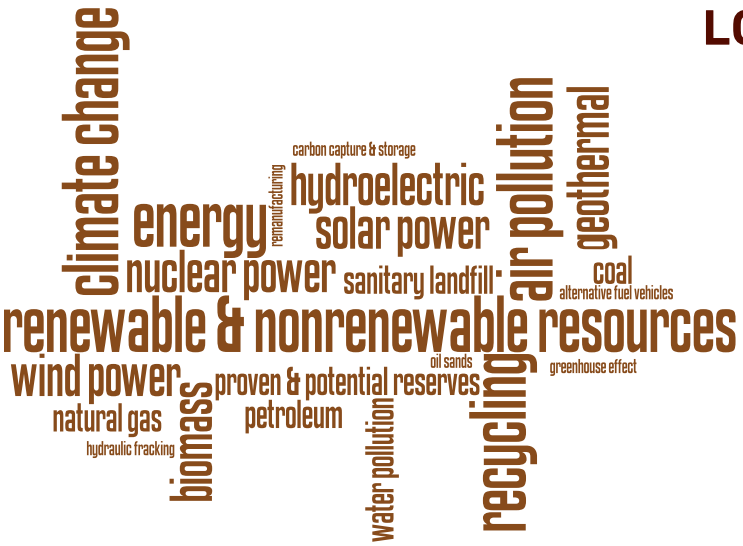
Pollution occurs when more waste is added to a resource than it can accommodate. Human actions pollute Earth's air, water, and land.

14.4 Where Are Resources Being Protected?

Sustainable development can be achieved through preservation and conservation of resources. Humans can reduce the amount of pollution by either consuming less of a product that causes pollution or recycling more of the products that they use.

▶ Solar power and water pump to irrigate farm fields, India.

People have always transformed Earth's land, water, and air for their benefit. Humans once believed Earth's resources to be infinite or at least so vast that human actions could never harm or deplete them. But human actions in recent years have consumed, polluted, and modified much of Earth's resources. Future generations will pay the price if we continue to rapidly consume and mismanage Earth's resources.



LOCATIONS EXPLORED IN THIS CHAPTER

KEY ISSUE

14.1 | Where Are Energy Resources Distributed?

Earth offers a large array of resources for people to use. A *resource* was defined in Chapter 1 as a substance in the environment that is useful to people, is economically and technologically feasible to access, and is socially acceptable to use. Energy resources are especially valuable. We depend on abundant, low-cost energy and minerals to run our industries, keep our homes comfortable, and transport ourselves. But we are depleting the supply of some energy resources.

Conservation was defined in Chapter 1 as the sustainable management of a natural resource to meet human needs. The concept of conservation reflects a balance between natural resources, such as wildlife, water, and air, and human needs, such as food, medicine, and recreation. Renewable resources such as trees are conserved if they are consumed at a less rapid rate than they can be replaced. Nonrenewable resources such as fossil fuels are conserved if remaining reserves are maintained for future generations.

Conservation differs from **preservation**, which is the maintenance of resources in their present condition with as little human impact as possible. Preservation takes the view that the value of nature does not derive from human needs and interests but from the fact that every plant and animal living on Earth has a right to exist and should be preserved regardless of the cost.

Energy Supply & Demand

Learning Outcome 14.1.1 Identify the principal sources of energy supply and demand.

Historically, people relied primarily on **animate power**, which is energy supplied by the labor of animals or people themselves. Now more than 80 percent of the world's energy is supplied by the burning of three fossil fuels – coal, petroleum, and natural gas (Figure 14-1).

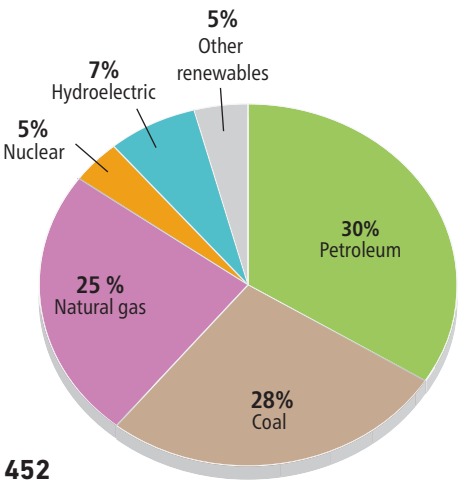


FIGURE 14-1 WORLD ENERGY SUPPLY Three fossil fuels—coal, petroleum, and natural gas—supply most of the world's energy.
Source: U.S. Department of Energy

A **fossil fuel** is an energy source formed from the residue of plants and animals buried millions of years ago. As sediment accumulated over plant and animal remains, intense pressure and chemical reactions slowly converted the buried organisms into the fossil fuels that are currently used. When fossil fuels are burned, energy that was stored in plants and animals millions of years ago is released.

A resource can be renewable or nonrenewable. A **renewable resource** is produced in nature more rapidly than it is consumed by humans. A **nonrenewable resource** is produced in nature more slowly than it is consumed by humans. Fossil fuels are examples of nonrenewable energy resources that have finite supplies capable of being exhausted.

Energy Supply

Geographers observe two important inequalities in the distribution of energy supply and demand:

- **Supply.** The quantity of something that producers have available for sale is **supply**. Some regions have abundant supply of energy resources, whereas others have little.
- **Demand.** The quantity that people wish to consume and are able to buy is **demand**. The heaviest consumers of energy are in developed countries, whereas most of the energy sources are currently found in developing countries.

Given the centrality of energy in contemporary economies and cultures, the unequal distribution in the supply and demand of fossil fuels has been a major challenge for industry and a source of instability between developed and developing countries.

Although the three fossil fuels – coal, petroleum, and natural gas – account for most of the energy supply in the United States, the relative importance of the three has changed over time. In the twenty-first century, coal is accounting for a decreasing share of U.S. energy supply, whereas natural gas is accounting for an increasing share (Figure 14-2).

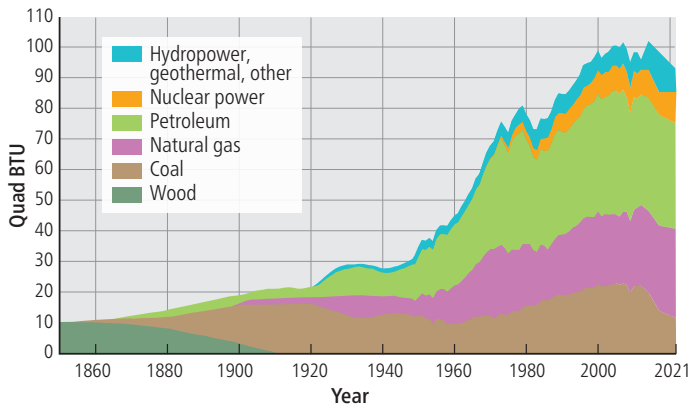
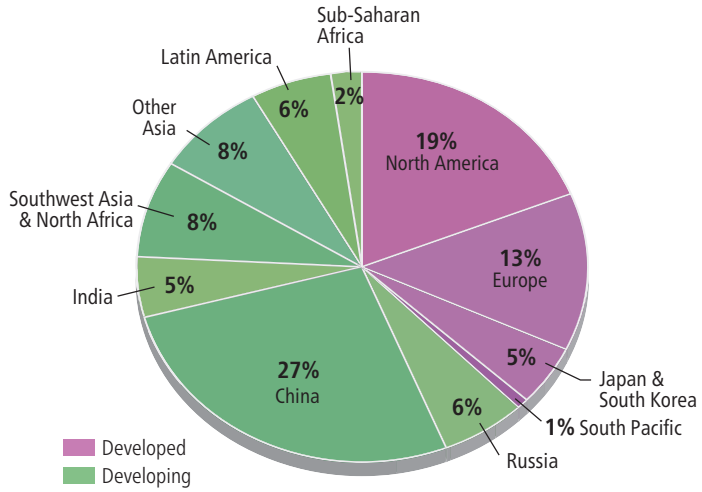


FIGURE 14-2 CHANGING U.S. ENERGY SUPPLY Petroleum, natural gas, and coal account for around 70 percent of all energy produced in the United States.
Source: U.S. Department of Energy

Energy Demand

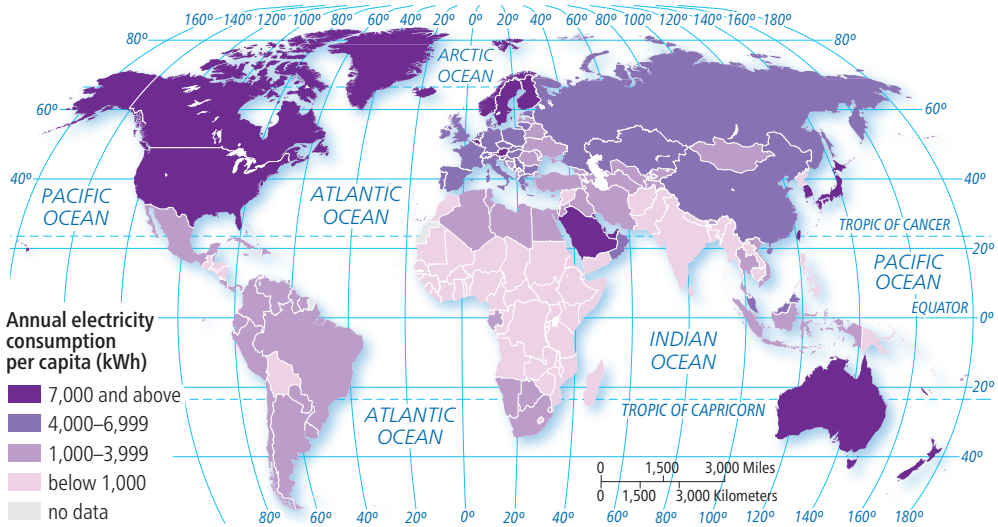
Developed countries such as the United States are highly dependent on the three fossil fuels:

- **Coal.** Wood was the principal energy source in the world prior to the nineteenth century. As countries in North America and Europe developed rapidly during the Industrial Revolution, coal supplanted wood as the leading energy source.
- **Petroleum.** First pumped in 1859, petroleum became the most important source of energy for developed countries in the mid-twentieth century with the diffusion of motor vehicles.
- **Natural gas.** Originally burned off as a waste product of petroleum drilling, natural gas is now the most important source of energy for heating homes and producing electricity in the United States.



▲ **FIGURE 14-3 SHARE OF WORLD ENERGY DEMAND BY COUNTRY**
Source: U.S. Department of Energy

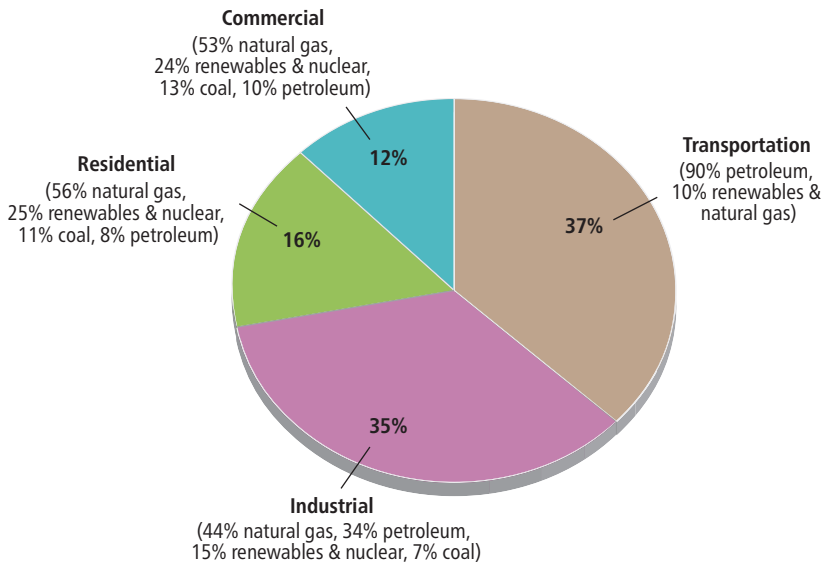
Developing countries account for more than 60 percent of the world's total demand for energy (Figure 14-3). Demand has increased at a much faster rate in developing countries; in 1990, developing countries and developed countries each demanded around the same amount of energy. China has surpassed the United States as the country that uses the most energy. Still, the highest per capita consumption of energy remains in North America; the region contains 5 percent of the world's people but consumes around 19 percent of the world's energy (Figure 14-4).



▲ **FIGURE 14-4 ENERGY DEMAND PER CAPITA** The highest per capita demand is in North America. The lowest per capita demand is in sub-Saharan Africa.
Source: U.S. Department of Energy

Demand for energy in the United States comes from four principal sources (Figure 14-5):

- **Industry.** Factories use primarily natural gas and petroleum.
- **Transportation.** Almost all transportation systems run on petroleum products.
- **Homes.** Natural gas provides around one-half of home needs. Natural gas is the principal source of home heating and cooking, whereas electricity is generated from a mix of natural gas, coal, nuclear, and renewable energy sources.
- **Commercial.** Stores and offices have uses and sources similar to those for homes.



▲ **FIGURE 14-5 U.S. ENERGY DEMAND BY SECTOR**
Source: U.S. Department of Energy

Pause & Reflect 14.1.1 What does the graph of Figure 14-2 show us is happening to the production of the three fossil fuels in the United States in the twenty-first century? Why might that be the case?

Supply of Fossil Fuels

Learning Outcome 14.1.2 Describe the distribution of fossil fuel supply.

Earth's fossil fuel resources are not distributed evenly. Some regions are well endowed with one or more fossil fuels, whereas other regions have little. The uneven distribution of fossil fuels partly reflects how fossil fuels form.

Distribution of Coal

Coal formed in tropical locations, in lush, swampy areas rich in plants. Thanks to the slow movement of Earth's drifting continents, the tropical swamps of 250 million years ago relocated to the mid-latitudes. As a result, today's main reserves of coal are in mid-latitude countries rather than in the tropics. China produces 51 percent of the world's coal; India 9 percent, Indonesia 8 percent, and the United States and Australia 6 percent each (Figure 14-6).

Figures 14-6, 14-7, and 14-8 use the same units (quad BTUs) as well as the same classes. *Quad* is short for *quadrillion* (1 quadrillion = 1,000,000,000,000,000), and *BTU* is short for *British thermal unit*. One quad BTU equals approximately 8 billion U.S. gallons of gasoline.

Distribution of Natural Gas

Natural gas formed millions of years ago from sediment deposited on the seafloor. The United States produces 24 percent of the world's natural gas, Russia 16 percent, and Southwest Asia & North Africa countries (led by Qatar and Saudi Arabia) 14 percent (Figure 14-7).

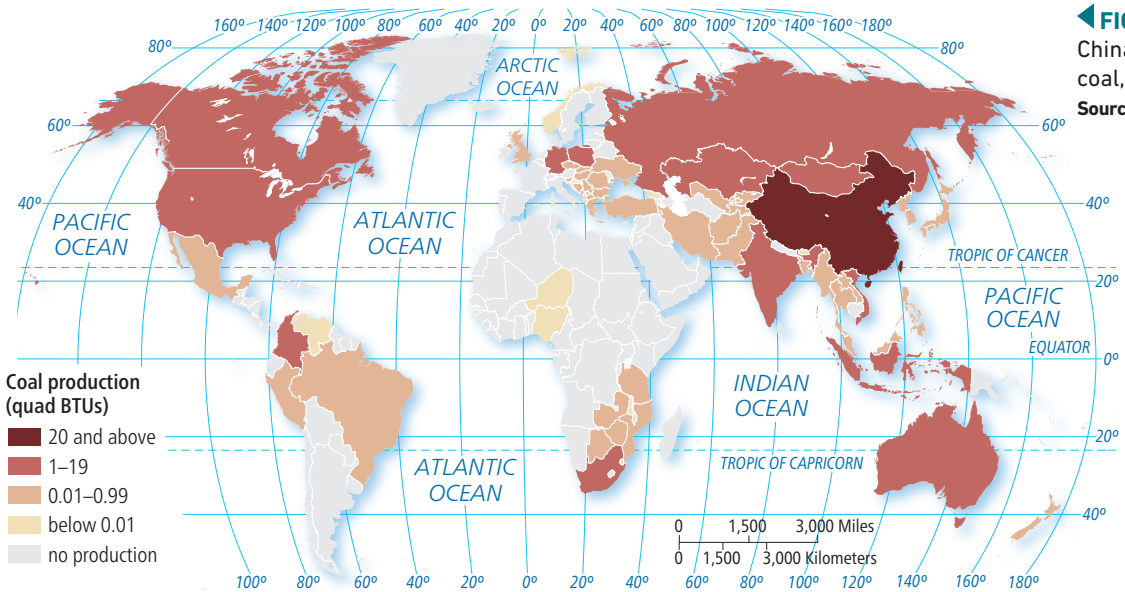


FIGURE 14-6 COAL PRODUCTION China is the leading producer of coal, followed by the United States.
Source: U.S. Department of Energy

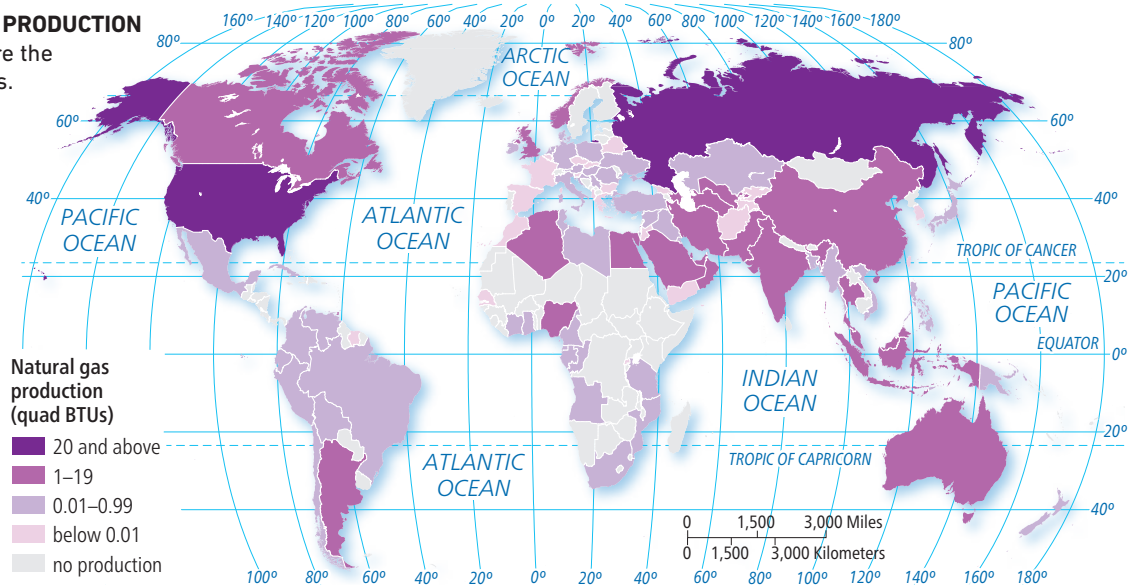


FIGURE 14-7 NATURAL GAS PRODUCTION The United States and Russia are the leading producers of natural gas.
Source: U.S. Department of Energy

Distribution of Petroleum

Like natural gas, petroleum formed millions of years ago from residue deposited on the seafloor. Some still lies beneath such seas as the Persian Gulf and the North Sea, but other reserves are located beneath land that was under water millions of years ago. Southwest Asia & North Africa (led by Saudi Arabia) and North America (led by the United States) each supply around one-fourth of the world's petroleum (Figure 14-8).

The concentration of the supply of petroleum in relatively few countries, combined with the strong demand for petroleum around the world, especially to fuel motor vehicles, has led to volatility of the price that consumers pay for petroleum. The price of petroleum is typically quoted as dollars per barrel. A barrel contains 42 U.S. gallons of crude oil. Because of additives placed in the oil during refining, a barrel yields 44 U.S. gallons of refined petroleum products, such as at the service station gas pump.

The price of petroleum has fluctuated from around $10 per barrel during the 1990s to more than $100 per barrel on several occasions during the twenty-first century. World events often trigger increases and decreases in the price. For example, the price dropped sharply during the COVID-19 lockdown in 2020, when travel was restricted in many places, and it increased sharply after Russia's invasion of Ukraine in 2022 (Figure 14-9).

Pause & Reflect 14.1.2 What developed region appears to have limited fossil fuel resources? How might it obtain needed fossil fuels?

FIGURE 14-8
PETROLEUM PRODUCTION
The United States, Russia, and Saudi Arabia are the leading producers of petroleum.
Source: U.S. Department of Energy

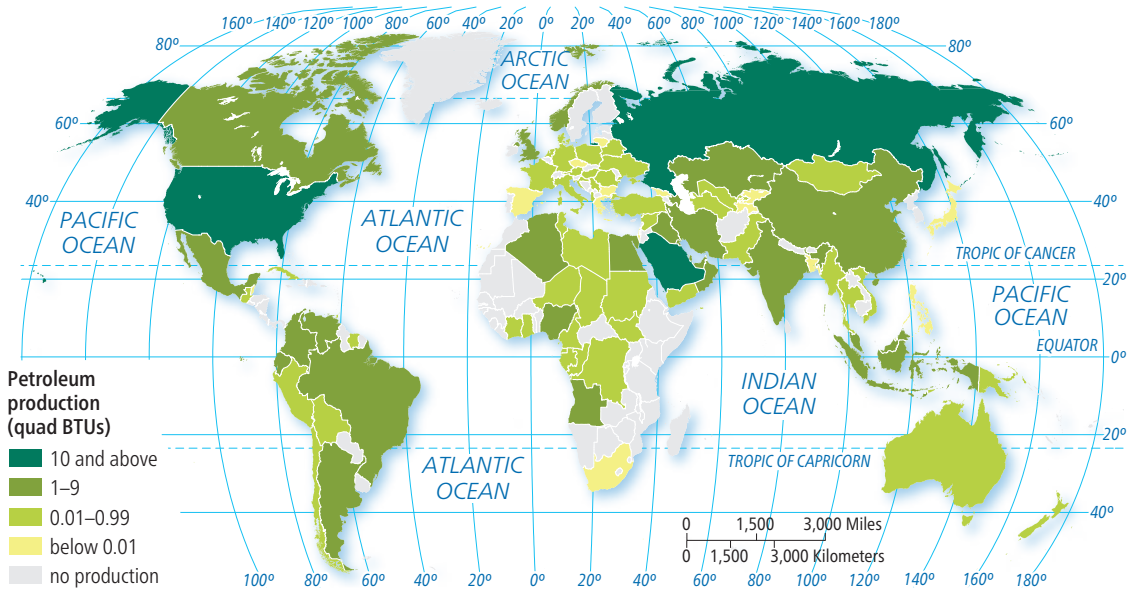
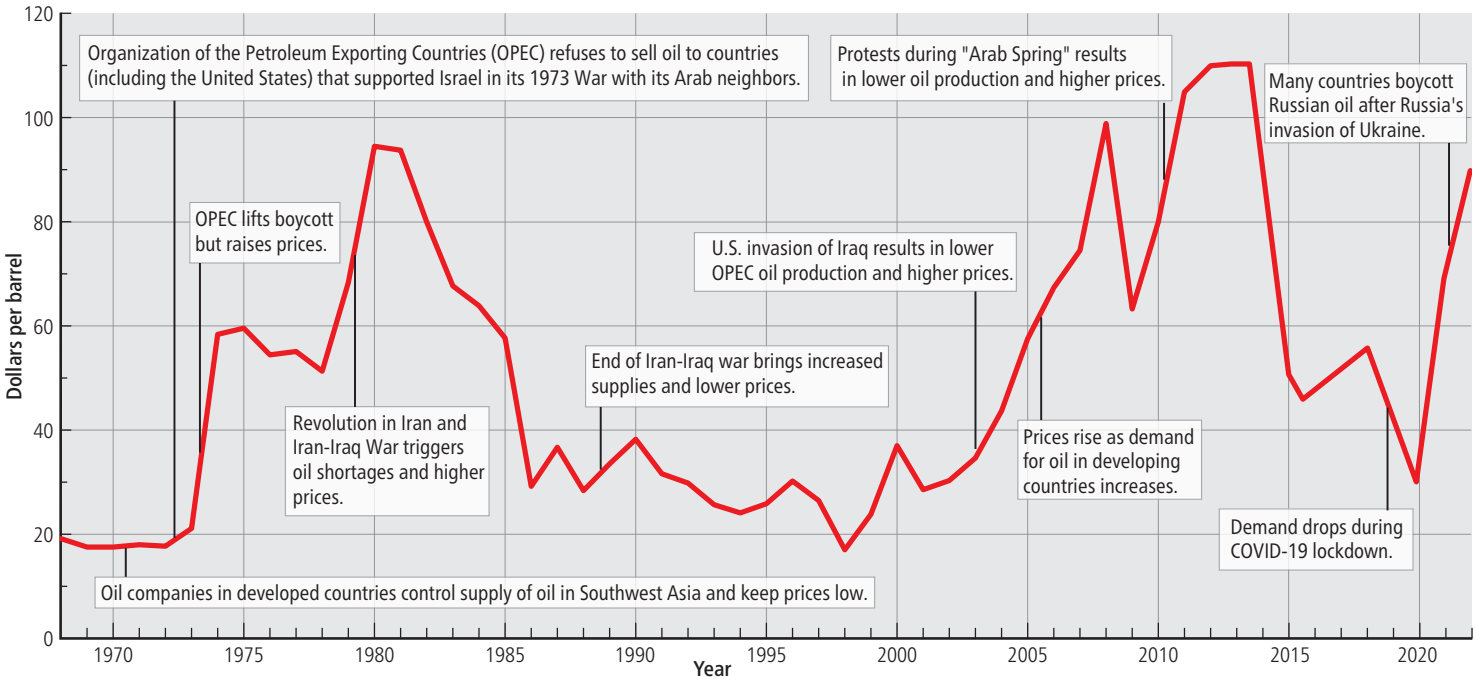


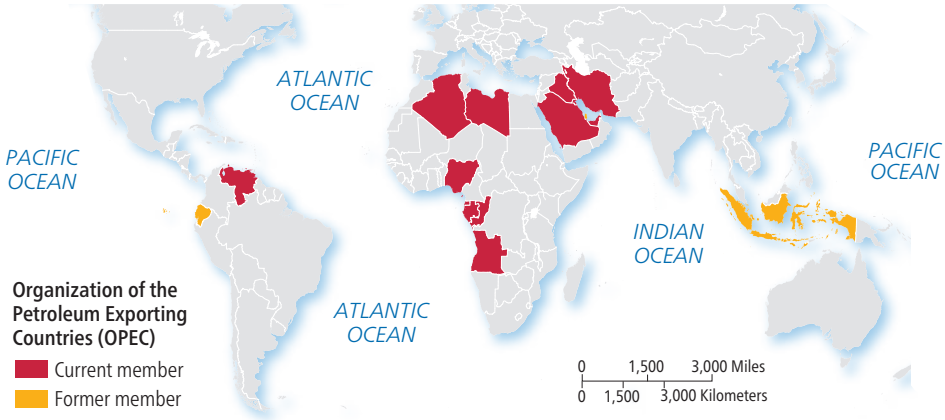
FIGURE 14-9
OIL PRICE HISTORY
The price of oil has changed sharply on several occasions.
Source: BP Statistical Review of World Energy



Petroleum Challenges

Learning Outcome 14.1.3 Describe changing patterns of petroleum trade and demand.

Maintaining a consistent supply of petroleum has been especially challenging in recent years. Most of the world's petroleum is supplied by countries in Southwest Asia & North Africa and Central Asia, two regions strongly impacted by religious, ethnic, and political conflicts discussed in Chapters 6 through 8. On the other hand, developed countries in North America and Europe demand disproportionately large shares of petroleum.



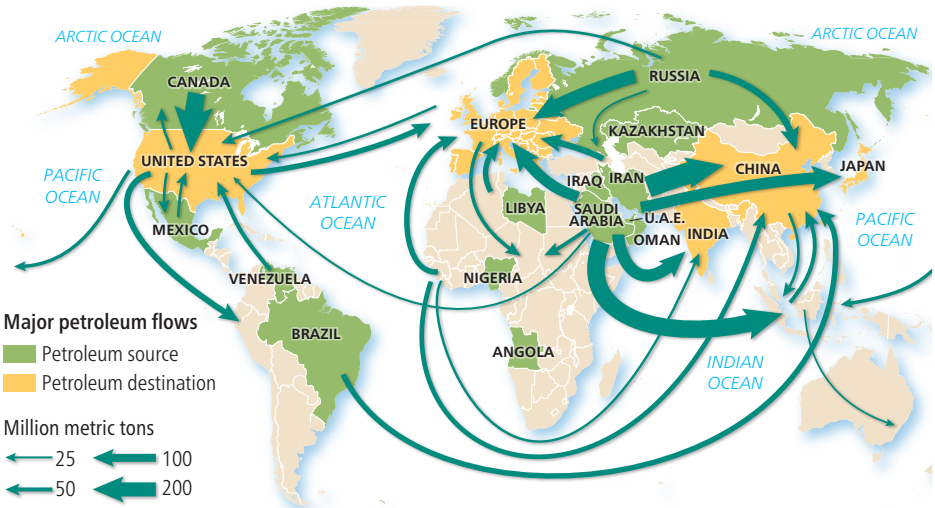
▲ **FIGURE 14-10 OPEC MEMBERS**

World Oil Trade

Developed countries supply a large share of the world's fossil fuels, but they demand more energy than they produce, so they must import fossil fuels, especially petroleum, from developing countries. Several developing countries possessing substantial petroleum reserves, primarily in Southwest Asia & North Africa, created the Organization of the Petroleum Exporting Countries (OPEC) in 1960 (Figure 14-10). OPEC was originally formed to enable oil-rich countries to gain more control over their resource. U.S. and European transnational companies, which had originally explored and exploited the oil fields of developing countries, were selling the petroleum at low prices to consumers in developed countries and keeping most of the profits. With the creation of OPEC, countries possessing the oil reserves nationalized or more tightly controlled the fields, and prices were set by OPEC member governments rather than by petroleum companies. Thirteen countries are currently members of OPEC (Figure 14-11).

▲ **FIGURE 14-11 OIL PRODUCTION, SAUDI ARABIA**

For several decades, the largest flows of oil have been from Russia to Europe and from Canada to the United States (Figure 14-12). The developed countries of Europe as well as Japan and South Korea import most of their petroleum. After Russia's invasion of Ukraine in 2022, Europe cut off most of its petroleum imports from Russia. Meanwhile, the United States has become more reliant on domestic sources of oil.



▲ **FIGURE 14-12 PETROLEUM TRADE**

Source: BP Statistical Review of World Energy

U.S. Oil Supply & Demand

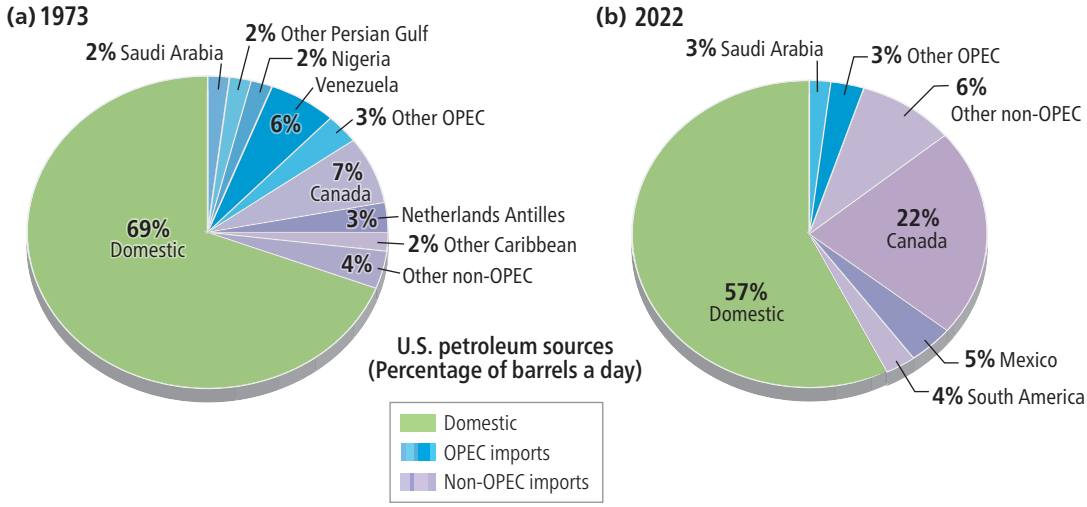
The United States produced more petroleum than it consumed during the first half of the twentieth century, and it was the world's leading producer in 2021. Nonetheless, the United States has a history of dependence on petroleum produced in other countries.

Beginning in the 1950s, the handful of large transnational companies then in control of international petroleum distribution determined that extracting petroleum in the United States was more expensive than importing it from Southwest and Central Asia. As a result, the United States became a net importer of petroleum.

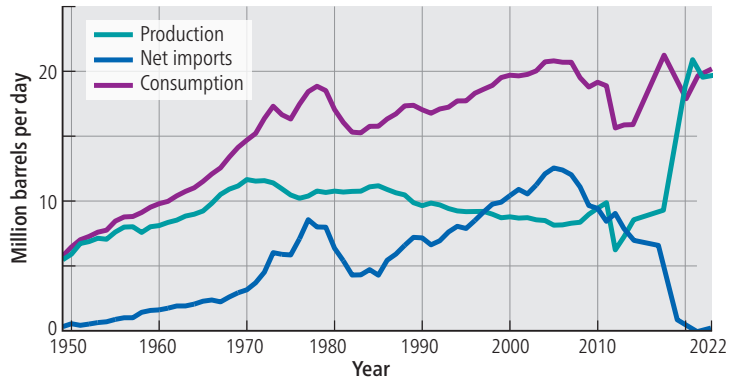
Since 1973, the petroleum that the United States imports has come from a different set of countries. For example, the share of U.S. petroleum imported from OPEC members declined from 15 percent in 1973 to 6 percent in 2022 (Figure 14-13). On the other hand, the share of U.S. petroleum imported from Canada increased from 7 percent in 1973 to 22 percent in 2022.

During the 2020s, imports and exports have been around the same level (Figure 14-14). The change from net importer to roughly equal imports and exports occurred because U.S. petroleum production doubled during the 2010s and because the United States exports more refined petroleum products like jet fuel. In addition, demand for petroleum in the United States declined sharply during the COVID-19 lockdown.

Gas prices in the United States are low by international standards. In 2022, the price of gas in the United States averaged $3.95 per gallon. The price per gallon ranged from $5.01 in June to $3.09 in December. In comparison, the price per gallon in 2022 in Europe averaged around $6.50 and ranged from around $5.50 in January to $7.50 in June (Figure 14-15). Motorists in India have been paying about the same price for gas as in the United States, although the average income in India is only around 10 percent of the U.S. level.

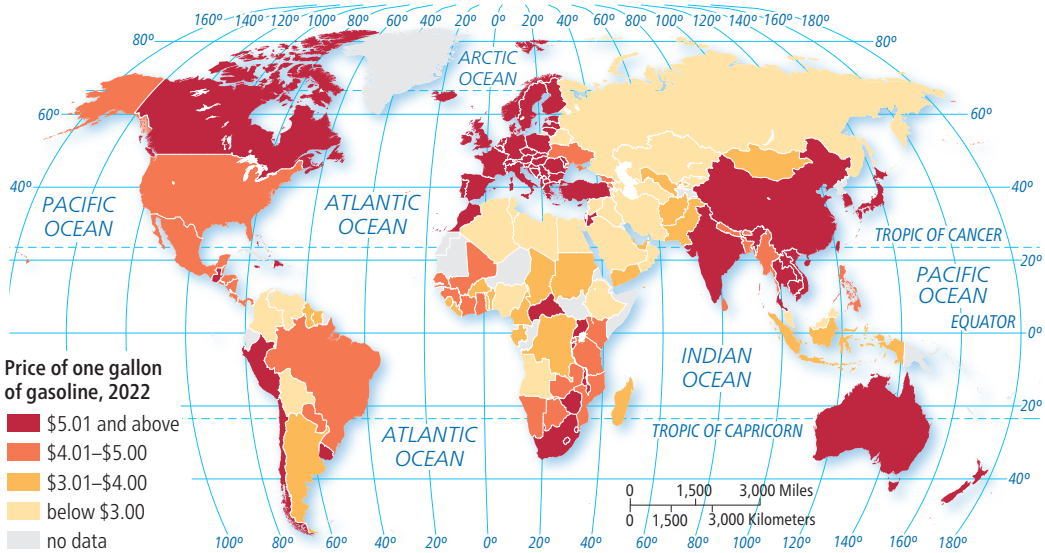


▲ **FIGURE 14-13 U.S. PETROLEUM PRODUCTION AND IMPORTS**
Source: U.S. Department of Energy



▲ **FIGURE 14-14 U.S. PETROLEUM SOURCES**
Source: U.S. Department of Energy

Pause & Reflect 14.1.3 Do you consider the price of gas when you or your family buy a vehicle? Why or why not?



▲ **FIGURE 14-15 GASOLINE PRICES AROUND THE WORLD** In mid-2022.

Fossil Fuel Futures

Learning Outcome 14.1.4 Evaluate possible future options for fossil fuels.

The world will not literally "run out" of fossil fuels during the twenty-first century. However, at some point, extracting the remaining reserves will prove so environmentally damaging and prohibitively expensive that use of alternative energy sources will accelerate.

Proven & Potential Reserves

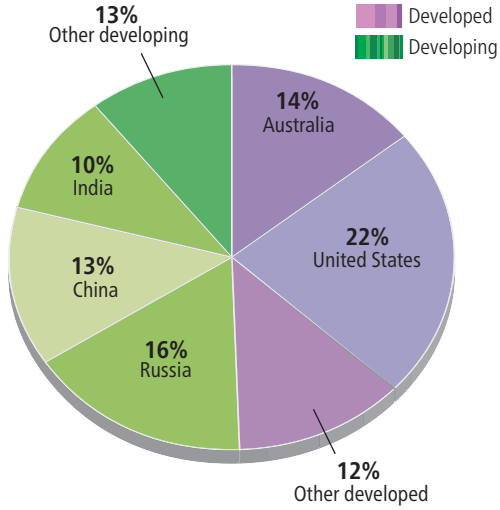
The supply of energy remaining in deposits that have been discovered is called a **proven reserve**. Proven reserves can be measured with reasonable accuracy:

- **Coal.** World coal reserves are approximately 1 quadrillion metric tons (23 million quad BTUs). At current demand, proven coal reserves would last around 150 years. The United States, Russia, China, Australia, and India have three-fourths of the world's proven coal reserves (Figure 14-16).
- **Natural gas.** World natural gas reserves are approximately 7,300 trillion cubic meters (7,300 quad BTUs). At current demand, proven natural gas reserves would last around 50 years. Iran, Russia, and Qatar together have more than one-half of the world's proven reserves (Figure 14-17).
- **Petroleum.** World petroleum reserves are approximately 1.7 trillion barrels (9,000 quad BTUs). At current demand, proven petroleum reserves would last around 60 years. OPEC countries (led by Venezuela, Saudi Arabia, Iran, and Iraq) have around 72 percent of the world's proven reserves (Figure 14-18).

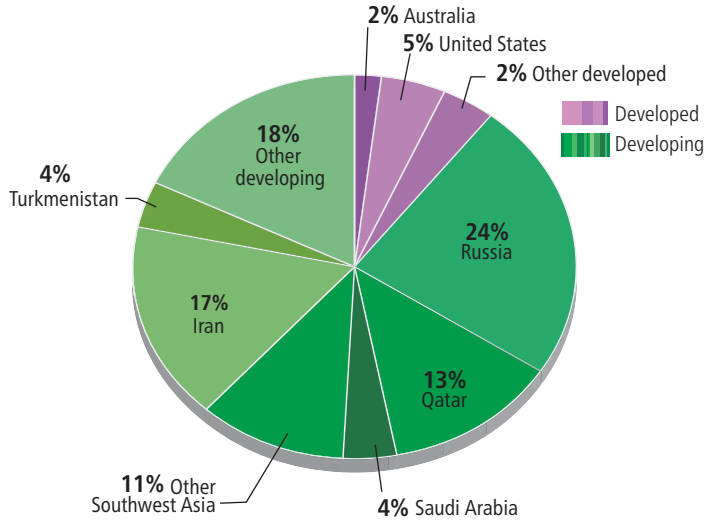
Some fossil fuel deposits have not yet been discovered. The supply in deposits that are undiscovered but thought to exist is a **potential reserve**. When a potential reserve is actually discovered, it is reclassified as a proven reserve.

Potential reserves can be converted to proven reserves in two ways:

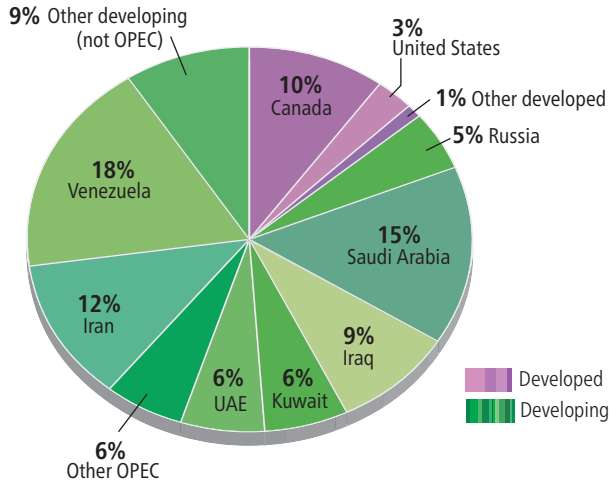
- **Fields yet to be developed.** When it was first exploited, petroleum "gushed" from wells drilled into rock layers saturated with it. Coal was quarried in open pits. But now extraction is more difficult. Removing the last supplies from a proven field is comparable to wringing out a soaked towel. It is easy to quickly remove the main volume of water, but the last few drops require more effort – in the case of petroleum, more time, more expense, and special technology.
- **Fields yet to be discovered.** The largest, most accessible deposits of petroleum, natural gas, and coal have already been exploited. Newly discovered reserves are generally smaller and more remote, such as beneath the seafloor, and extraction is costly and potentially damaging to the environment. Exploration costs have increased because methods are more elaborate in order to minimize environmental damage, and the probability of finding new reserves is lower. But as energy prices climb, exploration costs may be justified.



▲ **FIGURE 14-16 PROVEN RESERVES OF COAL**
Sources: BP Statistical Review of World Energy and U.S. Department of Energy



▲ **FIGURE 14-17 PROVEN RESERVES OF NATURAL GAS**
Sources: BP Statistical Review of World Energy and U.S. Department of Energy



▲ **FIGURE 14-18 PROVEN RESERVES OF PETROLEUM**
Sources: BP Statistical Review of World Energy and U.S. Department of Energy

Unconventional Fossil Fuel Resources

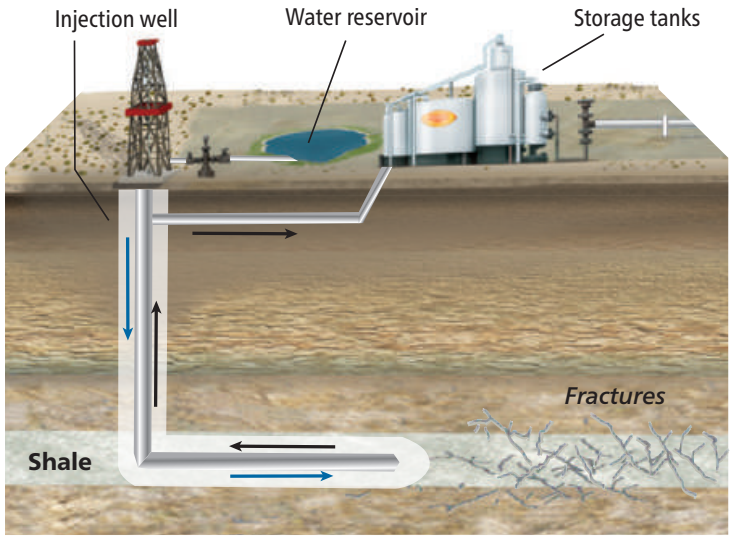
Reserves of fossil fuels are considered unconventional if we lack economically feasible or environmentally sound technology with which to extract the resources. However, as supply decreases and demand increases for a resource and prices rise, exploiting an unconventional reserve can become profitable. Here are two current examples related to fossil fuels:

- **Oil sands.** Abundant oil sands are found in Alberta, Canada (Figure 14-19), as well as in Venezuela and Russia. Oil sands are saturated with thick petroleum commonly called tar because of its dark color and strong odor. The mining of Alberta oil sands has become profitable, and extensive deposits of oil in Alberta oil sands have been reclassified from potential to proven reserves in recent years. As a result, Canada is now thought to have 10 percent of the world's petroleum proven reserves.
- **Hydraulic fracturing.** Rocks break apart naturally, and gas can fill the space between the rocks. **Hydraulic fracturing**, commonly called **fracking**, involves pumping water at high pressure to further break apart rocks and thereby release more gas that can be extracted (Figure 14-20). The United States has extensive natural gas fields, some of which are now being exploited through fracking. Within the United States, the principal natural gas fields are in Texas, Oklahoma, and the Appalachian Mountains (Figure 14-21). Opponents of fracking fear environmental damage from pumping high-pressure water beneath Earth's surface. Safety precautions can minimize the environmental threat, but fracking does require the use of a large supply of water, and water is in high demand for other important uses, such as human consumption and agriculture.

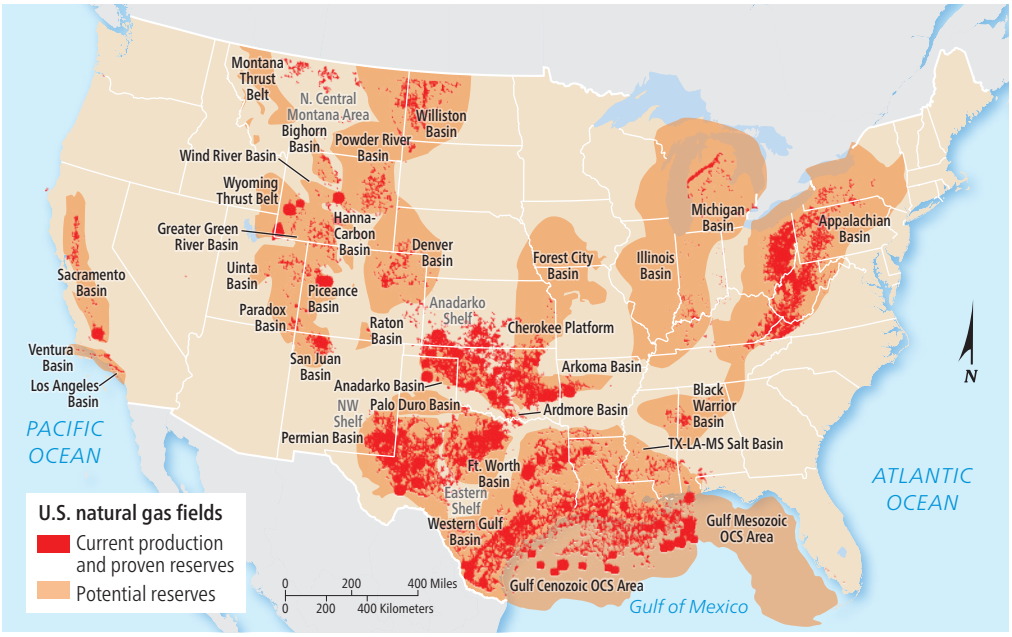
The issue for the world is whether dwindling petroleum reserves are handled wisely and peacefully during a transition process of substituting nonrenewable energy resources for renewable energy resources. Given the massive growth in petroleum consumption expected in developing countries such as China and India, the United States and other developed countries may have little influence over when prices rise and supplies decline. In this challenging environment, all countries will need to pursue sustainable development strategies based on increased reliance on renewable energy sources.

Pause & Reflect 14.1.4 What environmental problems appear to be faced by increased reliance on unconventional fossil fuel sources?

▲ **FIGURE 14-19 ALBERTA OIL SANDS**



▲ **FIGURE 14-20 HYDRAULIC FRACTURING (FRACKING)**



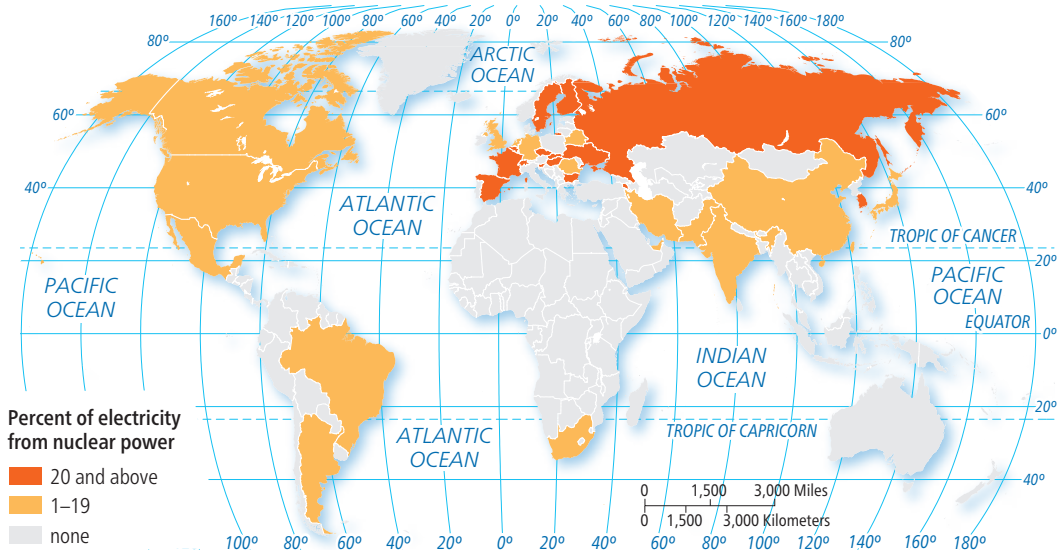
▲ **FIGURE 14-21 U.S. NATURAL GAS FIELDS**

Source: U.S. Department of Energy

KEY ISSUE

14.2 | Why Might We Rely More on Alternative Energy Sources?

About 21 percent of energy consumed in the United States is generated by sources other than the three fossil fuels. Renewable sources supply around 13 percent of U.S. energy, a share that has doubled since 2010. Another source other than fossil fuels—nuclear power—accounts for 8 percent of U.S. energy consumption. Although renewable resources are increasingly harnessed for energy, continued reliance on the three nonrenewable fossil fuels continues to dominate U.S. energy consumption.



▲ **FIGURE 14-22 ELECTRICITY FROM NUCLEAR POWER**
Source: Nuclear Energy Institute

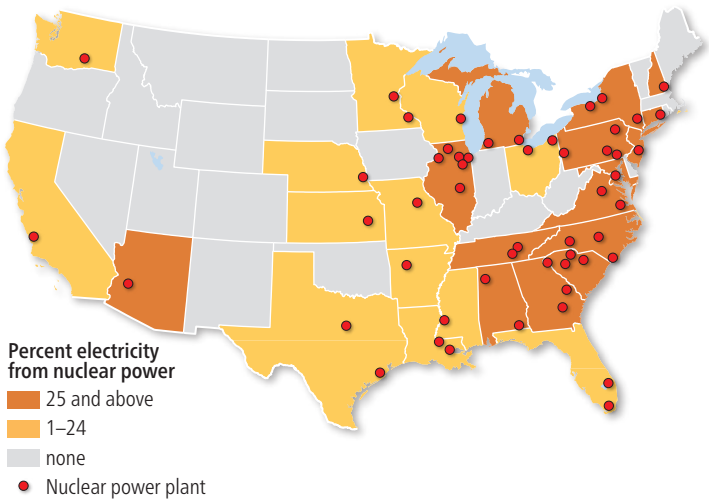
Nuclear Energy

Learning Outcome 14.2.1 Describe the distribution of nuclear energy and challenges in using it.

Nuclear power is not renewable, but some view it as an alternative to fossil fuels. The big advantage of nuclear power is the large amount of energy released from a small amount of material. One kilogram of enriched nuclear fuel contains more than 2 million times the energy in 1 kilogram of coal. However, nuclear power presents serious challenges. When running smoothly, a nuclear power plant produces electricity from energy released by splitting uranium atoms in a controlled, chain reaction, a process called **nuclear fission**.

Distribution of Nuclear Power

Nuclear power supplies 5 percent of the world's energy. More than two-thirds of the world's nuclear power is generated in developed countries, with Europe and North America responsible for generating around one-third each. Only 34 of the world's nearly 200 countries make some use of nuclear power, including 22 developed countries and only 12 developing countries. The countries most highly dependent on nuclear power are clustered in Europe (Figure 14-22), where it supplies one-half of all electricity in France and Slovakia and one-fourth in Europe as a whole.



▲ **FIGURE 14-23 NUCLEAR POWER BY U.S. STATE**
Source: Nuclear Energy Institute

Dependency on nuclear power varies widely among U.S. states (Figure 14-23). Nuclear power accounts for more than 50 percent of electricity in Illinois, New Hampshire, and South Carolina. At the other extreme, 22 states and the District of Columbia utilize no nuclear power.

Nuclear power plants cost several billion dollars to build, primarily because of the elaborate safety measures required. Without double and triple backup systems at nuclear power plants, nuclear energy would be too dangerous to use. Uranium, a metal used to fuel nuclear power plants, is mined in one place, refined in another, and used in still another. As with coal, mining uranium can pollute land and water and damage miners' health. The complexities of safe transportation add to the cost. As a result, generating electricity from nuclear plants is much more expensive than from coal-burning plants. The future of nuclear power has been seriously hurt by the high costs associated with reducing risks.

Challenges in Using Nuclear Power

Many obstacles stand in the way of reliance on nuclear power. The principal challenge is safety.

Potential Nuclear Power Plant Accidents. Nuclear power plants cannot explode, like a nuclear bomb, because the quantities of uranium are too small and cannot be brought together fast enough. However, it is possible to have a runaway reaction, which overheats the reactor, causing a meltdown, possible steam explosions, and scattering of radioactive material into the atmosphere. This happened in 1986 at Chernobyl, then in the Soviet Union and now in the north of Ukraine, near the Belarus border. The accident caused 59 deaths due to exposure to high radiation doses and an estimated 4,000 cancer-related deaths.

Following an earthquake and tsunami in 2011, three of the six reactors at Japan's Fukushima Daiichi nuclear power plant experienced full meltdown, resulting in release of radioactive materials. Three workers died; the death toll among nearby residents exposed to high levels of radioactivity won't be known for years.

The issue with nuclear fission might be addressed by switching to **nuclear fusion**, which is the release of energy by the fusing of hydrogen atoms to form helium. Meltdowns are not a threat in nuclear fusion because chain reactions are not possible. Unfortunately, nuclear fusion can occur only at very high temperatures (millions of degrees) that cannot be generated on a sustained basis in a power-plant reactor with current technology.

Radioactive Waste. A product of nuclear fission is radioactive waste, certain types of which are lethal to people exposed to it. The waste from nuclear fission is highly radioactive and lethal, and it remains so for many years. Plutonium for making nuclear weapons can be harvested from this waste. Pipes, concrete, and water near the fissioning fuel also become "hot" with radioactivity. No one has yet devised permanent storage for radioactive waste. The waste cannot be burned or chemically treated, and it must be isolated for several thousand years until it loses its radioactivity.

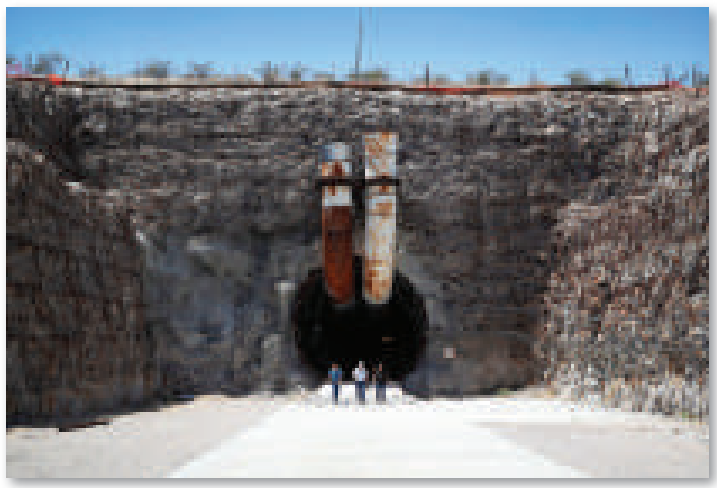
The United States is Earth's third-largest country in land area, yet it has failed to find a suitable underground storage site because of political opposition and worry about groundwater contamination. The U.S. Department of Energy approved a plan to store the waste in Nevada's Yucca Mountains in 2002, but federal funding for the project ended in 2011, following intense public opposition (Figure 14-24). In the meantime, most U.S. nuclear power plants are storing radioactive waste in "temporary" steel and concrete casks. Some waste is being stored at the Waste Isolation Pilot Plant 660 meters (2,150 feet) below the surface in New Mexico.

Nuclear Bomb Material. Along with generating nuclear energy, nuclear fission also makes possible nuclear bombs. The world has eight acknowledged nuclear powers, as discussed in Chapter 8. The diffusion of nuclear programs to countries sympathetic to terrorists has been particularly worrying to the rest of the world and has been a major factor in longtime tensions between Iran and other countries that do not want Iran to gain the capability of building a nuclear weapon.

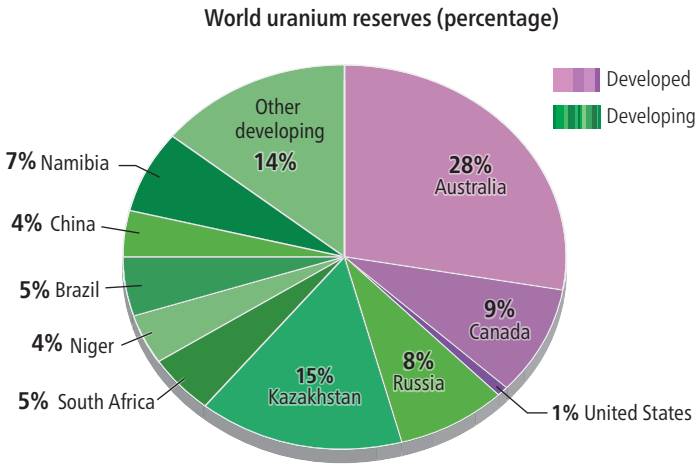
Limited Uranium Reserves. Uranium is a nonrenewable resource. Proven uranium reserves will last about 124 years at current rates of use. And they are not distributed uniformly around the world: Australia has 28 percent of the world's proven uranium reserves, Kazakhstan 15 percent, Canada 9 percent, and Russia 8 percent (Figure 14-25).

The chemical composition of natural uranium further aggravates the scarcity problem. Uranium ore naturally contains only 0.7 percent U-235; a greater concentration is needed for power generation. A breeder reactor turns uranium into a renewable resource by generating plutonium, also a nuclear fuel. However, plutonium is more lethal than uranium and could cause more deaths and injuries in an accident. Plutonium is also easier to fashion into a bomb. Because of these risks, few breeder reactors have been built, and none are in the United States.

Pause & Reflect 14.2.1 Should dependency on nuclear energy be increased or decreased? Why?



▲ **FIGURE 14-24 YUCCA MOUNTAIN NUCLEAR WASTE REPOSITORY** Nye County, Nevada.



▲ **FIGURE 14-25 WORLD URANIUM RESERVES**
Source: World Nuclear Association

Energy Alternatives

Learning Outcome 14.2.2 Identify alternatives sources of energy and challenges in using them.

A source of energy that has a theoretically unlimited supply and is not depleted when used by people is **renewable energy**. The fossil fuels that currently supply most of the world's energy needs are nonrenewable. Several sources of renewable energy are in use in the world.

Biomass

Before the widespread use of fossil fuels, biomass was the principal energy source that supplemented animate power. **Biomass fuel** is derived from burning wood, plant material, and animal waste directly or converting them to charcoal, alcohol, or methane gas. Biomass remains an important source of fuel in some developing countries.

When carefully harvested in forests, wood is a renewable resource that can be used to generate electricity and heat. The waste from processing wood, such as for building construction and demolition, is also available. And crops such as sugarcane, corn, and soybeans can be processed into motor-vehicle fuels. Worldwide production of biomass fuel is approximately 3 quad BTUs, including one-third each in North America, Europe, and developing regions. Brazil makes extensive use of biomass to fuel its cars and trucks.

The potential for increasing the use of biomass for fuel is limited for several reasons:

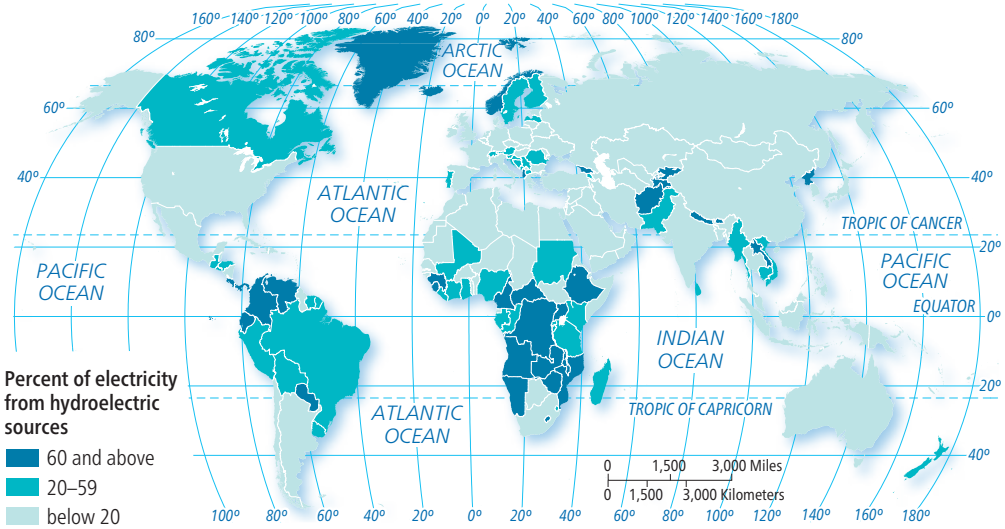
- Burning biomass may be inefficient because the energy used to produce the crops may be as much as the energy supplied by the crops.
- Biomass already serves essential purposes other than energy, such as providing much of Earth's food, clothing, and shelter.
- When wood is burned for fuel instead of being left in the forest to decompose and nourish soil, the fertility of the forest may be reduced.

Hydroelectric Power

Generating electricity from the movement of water is called **hydroelectric power**. Hydroelectric power, a renewable energy, is now the world's third-most widely used source of electricity after coal and natural gas. Two-thirds of the world's hydroelectric power is generated in developing countries and one-third in developed countries. A number of developing countries depend on hydroelectric power for most of their electricity (Figure 14-26).

The most populous country to depend primarily on hydroelectric power is Brazil (Figure 14-27). Brazil has made considerable progress toward sustainable development by generating 55 percent of its electricity from hydroelectric power and 21 percent from other renewable sources. Among developed countries, Canada generates around 60 percent of its electricity from hydroelectric power. The United States is a leading producer of hydroelectric power but obtains only 6 percent of its electricity from that source. This percentage may decline because few acceptable sites to build new dams remain.

Energy from water is also being utilized on a limited basis through **tidal power**, which is the conversion of energy generated by tidal flows into electricity. Several tidal generators have been constructed in Canada, France, and South Korea, taking advantage of the movement of tides offshore.



▲ **FIGURE 14-26 ELECTRICITY FROM HYDROELECTRIC POWER**

▲ **FIGURE 14-27 HYDROELECTRIC DAM** The Itaipu Dam is on the Paraná River, between Brazil and Paraguay. The name refers to a small island in the river and means "stepping stone" in the local Guarani language.

Wind Power

The benefits of wind-generated power seem irresistible. Construction of a wind turbine modifies the environment less severely than does construction of a dam. And wind power has greater potential for increased use because only a small portion of the resources – windy landscapes and oceanscapes – feature wind turbines to harness the renewable energy.

Despite its attractions, wind power has been harnessed in only a few places. Developed countries account for around one-half and China for around one-third of total world production (Figure 14-28). A significant obstacle for developing countries is the high cost of constructing wind turbines. One-third of the United States is considered windy enough to make wind power economically feasible.

Hundreds of wind "farms" consisting of large numbers of wind turbines have been constructed across the United States. But wind power has divided the environmental community. Some oppose construction of wind turbines because they can be noisy and lethal for birds and bats. Some also find wind farms a visual blight when they're constructed in places of outstanding beauty, such as in bodies of water (Figure 14-29).

FIGURE 14-28 WIND POWER

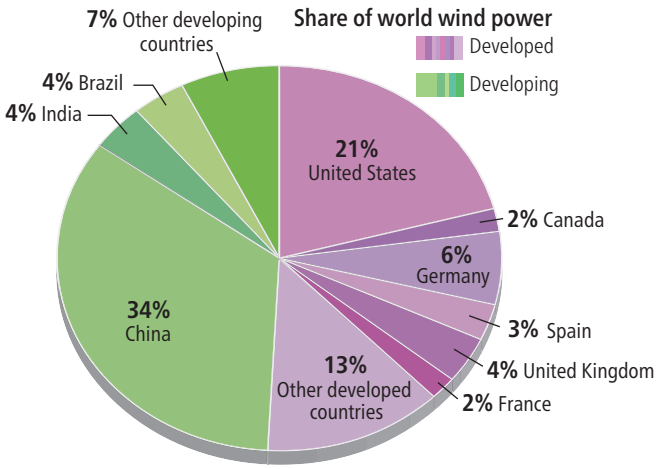


FIGURE 14-29 WIND FARM Middelgrunden wind farm, near Copenhagen, Denmark.

Geothermal Energy

Energy from hot water or steam is called **geothermal energy**. Natural nuclear reactions make Earth's interior hot. Toward the surface, in volcanic areas, this heat is especially pronounced. The hot rocks can encounter groundwater and produce heated water or steam that can be tapped by wells.

Harnessing geothermal energy is most feasible at sites along Earth's surface where crustal plates meet, which are also the sites of many earthquakes and volcanoes. The United States, Indonesia, the Philippines, and Türkiye together generate around 60 percent of the world's geothermal power (Figure 14-30). Ironically, in Iceland, named for its glaciers, nearly all homes and businesses in the capital Reykjavík are heated with geothermal steam (Figure 14-31).

Pause & Reflect 14.2.2 Does your local power company offer options for using alternative energy? Check the company's website.

FIGURE 14-30 GEOTHERMAL POWER

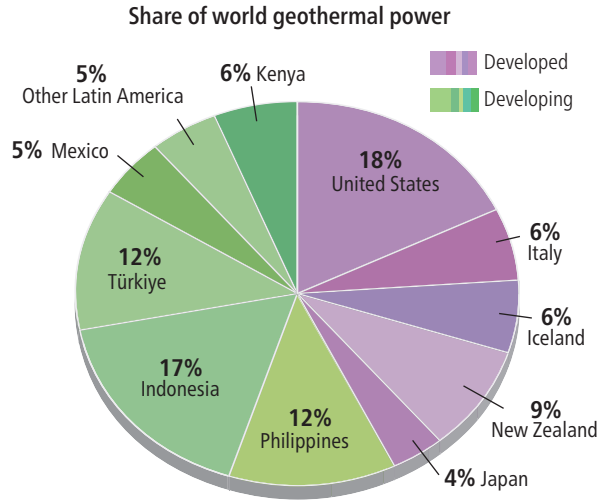


FIGURE 14-31 GEOTHERMAL IN ICELAND Strokkur Geyser.

Solar Energy

Learning Outcome 14.2.3 Compare passive and active solar energy.

The ultimate renewable resource for sustainable development is solar energy supplied by the Sun. Solar energy offers the possibility for countries at low levels of development to pursue sustainable economic growth. Through solar energy, people and businesses in developing countries currently unable to obtain electricity can generate energy needed to operate businesses, schools, and hospitals.

Solar energy currently accounts for only 0.3 quad BTU worldwide, and only a handful of countries account for most of the world's usage of solar energy (Figure 14-32). But the potential for growth is limitless. The Sun's remaining life is estimated at 5 billion years, and humans appear to be incapable of destroying or depleting that resource. The Sun's energy is free and ubiquitous and cannot be exclusively owned, bought, or sold by any particular individual or enterprise. Utilizing the Sun as a resource does not damage the environment or cause pollution, as do the extraction and burning of nonrenewable fossil fuels.

Passive Solar Energy

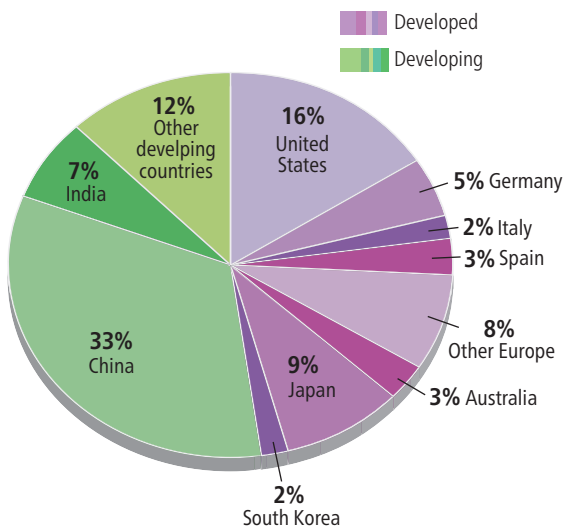
Solar energy is harnessed through either passive or active means. A **passive solar energy system** collects energy without the use of mechanical devices. Passive systems use south-facing windows and dark surfaces to heat and light buildings on sunny days. The Sun's rays penetrate the windows and are converted to heat.

Humans act as passive solar energy collectors when they are warmed by sunlight. And since dark objects absorb more energy than light ones, wearing dark clothing warms a person exposed to sunlight even more. Reliance on passive solar energy increased during the nineteenth century when construction innovations first permitted the hanging of massive glass "curtains" on a thin steel frame. Early skyscrapers made effective use of passive solar energy. Greenhouses enabled people to grow and view vegetation that required more warmth to flourish than the local climate permitted (Figure 14-33).

During World War II when fossil fuels were rationed, consumers looked for alternative energy sources. A major glass manufacturer, Libbey-Owens-Ford Glass Co., responded by publishing a book in 1947 titled *Your Solar House*. But with electricity and petroleum cheap and abundant after World War II and through most of the twentieth century, passive solar energy rarely played a major role in construction of homes and commercial buildings.

In recent years, building construction and remodeling have made more use of passive solar energy through advances in glass technology. Double- and triple-pane windows have higher insulating values, and low-E (low emissivity) glass can be coated to let heat in but not out. Window panes made with this glass are filled with argon or other gases that increase their insulating values beyond that of windows that have just air between the panes. Phase-change technologies can also switch the glass from opaque to translucent when a voltage is applied, enabling control of the amount of sunlight that shines through windows.

Pause & Reflect 14.2.3 Why are people warned not to leave a dog or child unattended in a parked car during the summer?



▲ **FIGURE 14-32 SOLAR POWER**

▲ **FIGURE 14-33 PASSIVE SOLAR ENERGY** Greenhouses, Maasland, Netherlands.

Active Solar Energy

An **active solar energy system** collects solar radiation through the use of mechanical devices and converts it either to heat energy or to electricity. The conversion can be accomplished either directly or indirectly.

In direct active solar energy, solar radiation is captured through **photovoltaic cells**, which convert light energy to electrical energy (Figure 14-34). Bell Laboratories invented the photovoltaic cell in 1954. Each cell generates only a small electric current, but large numbers of these cells wired together produce significant electricity. These cells are made primarily of silicon (also used in computers), the second most abundant element in Earth's crust. When the silicon is combined with one or more other materials, it exhibits distinctive electrical properties in the presence of sunlight, known as the photovoltaic effect. Electrons excited by the light move through the silicon, producing direct current (DC) electricity.

In indirect active solar energy, solar radiation is first converted to heat and then to electricity. The Sun's rays are concentrated by reflectors onto a pipe filled with synthetic oil. The heat from the oil-filled pipe generates steam to run turbines. In heat conversion, solar radiation is concentrated with large reflectors and lenses to heat water or rocks. These store the energy for use at night and on cloudy days. A place that receives relatively little sunlight can use solar energy by using more reflectors and lenses and larger storage containers.

▲ **FIGURE 14-34 ACTIVE SOLAR ENERGY** Rooftop solar panels, hot water storage tanks, and satellite dishes, Old City, Jerusalem.

Solar-Powered Electricity

Solar power can be produced at a central station and distributed by an electric company, as coal- and nuclear-generated electricity are now supplied. However, with coal still relatively cheap and investment in nuclear power facilities already substantial, public and private utility companies have had little interest in solar technology.

In developed countries, solar-generated electricity is used in spacecraft and light-powered calculators and at remote sites where conventional power is unavailable, such as California's Mojave Desert. Solar energy is used primarily as a substitute for electricity in heating water. Rooftop devices collect, heat, and store water for apartment buildings in Israel and Japan and individual homes in the United States. The initial cost of installing a solar water heater is higher than hooking into the central system but may be justified if an individual plans to stay in the same house for a long time.

In developing countries, the largest and fastest-growing market for photovoltaic cells includes the 775 million people who lack electricity, especially residents of remote villages (Figure 14-35). For example, in sub-Saharan Africa, more homes have been electrified in recent years using photovoltaic cells than by hooking up to the central power grid. In Morocco, solar panels are sold in bazaars and open markets next to carpets and tinware.

The cost of cells must drop and their efficiency must improve for solar power to expand rapidly, with or without government support. Solar energy will become more attractive as other energy sources become more expensive. Eight of the ten largest solar manufacturers in the world are based in China. Most solar panels available in the United States are imported from Asia.

▲ **FIGURE 14-35 SOLAR-POWERED ENERGY IN A DEVELOPING COUNTRY** Solar panels supply power to operate a radio station, Arua, Uganda.

KEY ISSUE

14.3 | Why Are Resources Being Polluted?

In our consideration of resources, consumption is half of the equation—disposal of waste after consuming resources is the other half. People rely on air, water, and land to remove and disperse their waste. Sometimes, people discharge more waste than the air, water, and land can handle. **Pollution** occurs when more waste is discharged into air, water, and land than those resources can handle. Harmful materials can be burned into the air, dumped into water, or discarded on land.

Air Pollution

Learning Outcome 14.3.1 Describe causes and effects of air pollution at global, regional, and local scales.

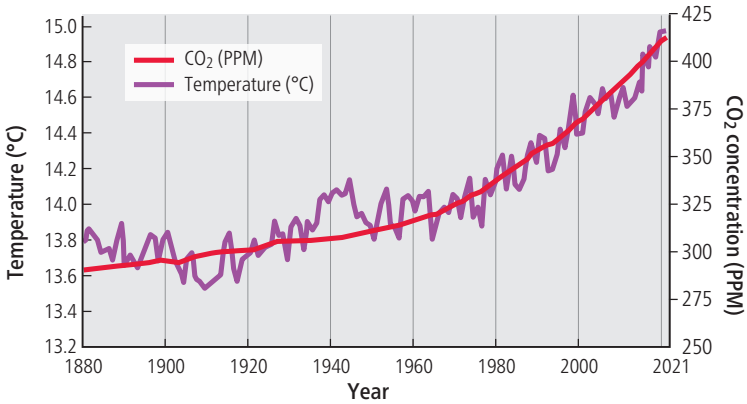
At ground level, Earth's average atmosphere is made up of about 78 percent nitrogen, 21 percent oxygen, and less than 1 percent argon. The remaining 0.04 percent includes several trace gases, some of which at critical levels. **Air pollution** is a concentration of trace substances at a greater level than occurs in average air. Concentrations of these trace gases in the air can damage property and adversely affect the health of people, other animals, and plants. Air pollution can be seen at global, regional, and local scales.

Global-Scale Air Pollution

Most air pollution is generated from factories and power plants as well as from motor vehicles. Factories and power plants produce sulfur dioxides and solid particulates, primarily from burning coal. Burning petroleum in motor vehicles produces carbon monoxide, hydrocarbons, and nitrogen oxides.

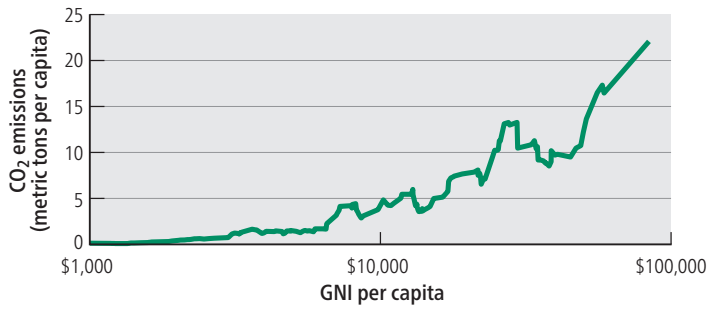
Climate Change. The average temperature of Earth's surface has increased by more than 1°C (2°F) since 1880 (Figure 14-36). This temperature increase is directly linked to human actions, especially the burning of fossil fuels in factories and vehicles, according to an international team of U.N. scientists.

When fossil fuels are burned, carbon dioxide is discharged into the atmosphere. Plants and oceans absorb much of the discharge, but increased fossil fuel burning during the past 200 years has caused the level of carbon dioxide in the atmosphere to rise by more than one-fourth, according to the U.N. Intergovernmental Panel on Climate Change (refer to Figure 14-36). The concentration of trace gases in the atmosphere can delay the return of some of the heat leaving Earth's surface heading for space, thereby raising Earth's temperatures. The increase in Earth's temperature, caused by carbon dioxide trapping some of the radiation emitted by the surface, is called the **greenhouse effect**.



▲ **FIGURE 14-36 GLOBAL WARMING AND CARBON DIOXIDE CONCENTRATIONS** Since 1880, carbon dioxide concentration has increased by more than one-third and Earth has warmed by more than 1°C (2°F).

Sources: NOAA and NASA



▲ **FIGURE 14-37 GNI AND POLLUTION**

Source: United Nations

As a country's per capita income increases, its per capita carbon dioxide emissions generally increase. Some European countries with gross national income (GNI) per capita between $30,000 and $50,000, show declines in pollution. However, countries with the world's highest GNIs per capita, including the United States and several countries in Southwest Asia, display the highest pollution levels (Figure 14-37).

Ozone Damage. **Ozone** is a gas that absorbs ultraviolet radiation in the stratosphere, a zone between 15 and 50 kilometers (9 to 30 miles) above Earth's surface. Were it not for the ozone in the stratosphere, UV rays would damage plants, cause skin cancer, and disrupt food chains.

Earth's protective ozone layer is threatened by pollutants called **chlorofluorocarbons (CFCs)**. CFCs such as Freon were once widely used as coolants in refrigerators and air conditioners. When they leak from these appliances, the CFCs are carried into the stratosphere, where they break down Earth's protective layer of ozone gas. Through a series of international agreements in the 1980s and 1990s, CFCs were targeted for phaseout. As a result, scientists observe a significant improvement in Earth's ozone layer.

Pause & Reflect 14.3.1 What gas is now most commonly used as a coolant instead of CFC? Use an online search engine to find the answer.

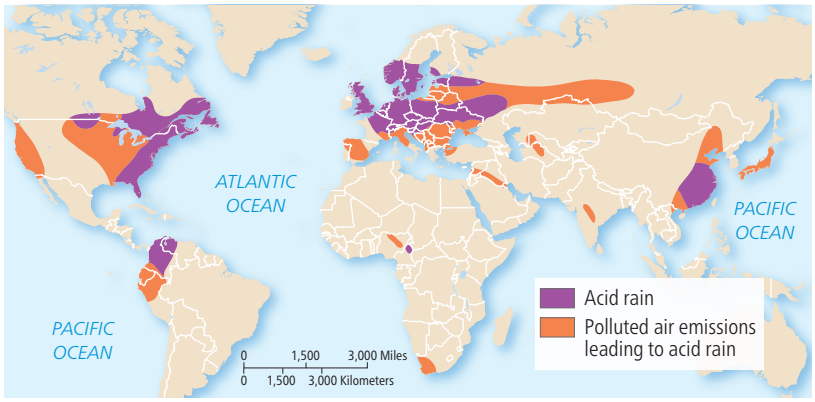
Regional-Scale Air Pollution

At the regional scale, air pollution may damage a region's vegetation and water supply through **acid deposition**, which is the accumulation of acids, including sulfuric acid and nitric acid, on Earth's surface. Especially affected by acid deposition are the world's principal industrial regions (Figure 14-38).

Sulfur oxides and nitrogen oxides, emitted by burning fossil fuels, enter the atmosphere, where they combine with oxygen and water. When dissolved in water, the acids may fall as **acid precipitation** (rain, snow, or fog) or be deposited in dust. Before they reach the surface, these acidic droplets might be carried hundreds of kilometers.

Acid precipitation damages lakes, killing fish and plants. On land, concentrations of acid in the soil can injure plants by depriving them of nutrients and can harm worms and insects. Buildings and monuments made of marble and limestone have suffered corrosion from acid rain.

Geographers are particularly interested in the effects of acid precipitation because the worst damage is not experienced at the same location as the emission of the pollutants. Within the United States, the major generators of acid deposition are in industrial states along the southern Great Lakes. However, the severest effects of acid rain are felt in several areas farther east. The United States reduced sulfur dioxide emissions significantly during the late twentieth century.



▲ **FIGURE 14-38 ACID PRECIPITATION**

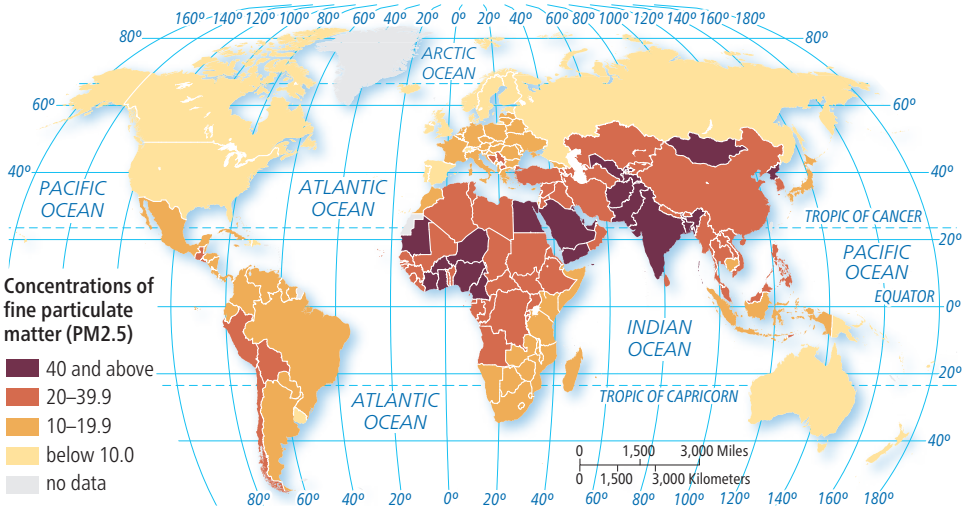
▲ **FIGURE 14-39 AIR POLLUTION: LAHORE, PAKISTAN** One of the world's most polluted cities.

Local-Scale Air Pollution

At the local scale, air pollution is especially severe in places where emission sources are concentrated, such as in urban areas. The air above urban areas may be polluted because a large number of factories, motor vehicles, and other polluters emit residuals in a concentrated area (Figure 14-39). Most of the cities with the worst air pollution are in Asia, especially China and India (Figures 14-40).

Urban air pollution has three basic components that have specific adverse effects on health:

- **Carbon monoxide.** Breathing carbon monoxide reduces the oxygen level in blood, impairs vision and alertness, and threatens those with breathing problems.
- **Hydrocarbons.** In the presence of sunlight, hydrocarbons, as well as nitrogen oxides, form **photochemical smog**, which causes respiratory problems, stinging in the eyes, and an ugly haze over cities.
- **Particulates.** They include a combination of dust and smoke particles. The dark plume of smoke from a factory stack and the exhaust of a diesel truck are examples of particulate emission. Exposure to particulates irritates the eyes and the throat, exacerbates asthma symptoms, and reduces lung function.



▲ **FIGURE 14-40 AIR POLLUTION BY COUNTRY** Countries with the highest concentrations of particulate matters are clustered in Asia and Africa.

Source: World Health Organization

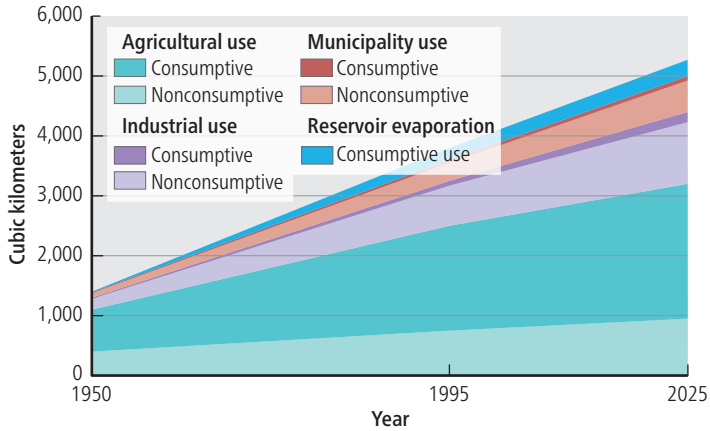
The worst urban air pollution occurs when winds are slight, skies are clear, and a temperature inversion exists. When the wind blows, it disperses pollutants; when it is calm, pollutants build. Sunlight provides the energy for the formation of smog. Air is normally cooler at higher elevations, but during temperature inversions – in which air is warmer at higher elevations – pollutants are trapped near the ground.

Water Pollution

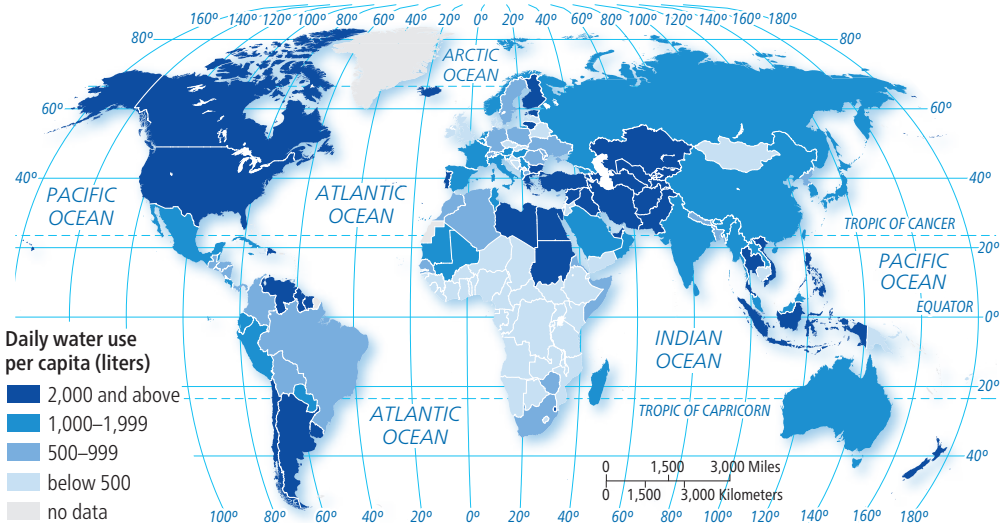
Learning Outcome 14.3.2 Compare and contrast sources of water pollution.

Water serves many human purposes. We use it for cooking and bathing, and we must drink it to survive. Water provides a location for boating, swimming, fishing, and other recreational activities. It is home to fish and other aquatic life. Water is essential for economic activities, including agriculture, manufacturing, and services discussed in Chapters 10, 11, and 12.

Water uses depend on fresh, clean, and unpolluted sources. But safe water sources are not always available because of pollution, and water pollution is widespread. It is easy to dump waste into a river and let the current carry it downstream, where it becomes someone else's problem. Rivers and lakes can decompose some waste without adversely impacting water quality, but the volume of waste dumped into rivers and lakes often exceeds the capacity that those sources can accommodate.



▲ **FIGURE 14-41 USES THAT DEMAND WATER**



▲ **FIGURE 14-42 WATER USAGE BY COUNTRY**
Source: United Nations

Demand for Water

Water usage is either nonconsumptive or consumptive.

- **Nonconsumptive water usage** is use of water that is returned to nature as a liquid. Most industrial and municipal uses of water are nonconsumptive because the wastewater is primarily discharged into lakes and streams.
- **Consumptive water usage** is use of water that evaporates rather than being returned to nature as a liquid. Most agricultural uses are consumptive because the water is used primarily to supply plants that transpire it and therefore it cannot be treated and reused.

Humans use around 5 quadrillion liters (5,000 cubic kilometers or 1.3 trillion gallons) of water per year. The heaviest water demand is for agriculture, followed by industry and municipal sewage systems (Figure 14-41). India uses around 761 trillion liters (200 trillion gallons) of water, China around 600 trillion liters (150 trillion gallons), and the United States around 450 trillion liters (120 trillion gallons). The United States has one of the world's highest per capita daily consumption of water, at 3,800 liters (1,000 gallons) per person, compared with 1,700 liters (450 gallons) in India and 1,165 (300 gallons) in China (Figure 14-42).

Water usage is extremely high in the United States primarily because of agriculture. U.S. farmers raise a large number of animals to meet the high demand for meat that the average American consumes, as discussed in Chapter 10. A large amount of water is also needed in U.S. agriculture to irrigate fields of crops. Agriculture accounts for approximately 80 percent of consumptive water use in the United States.

Impact on Aquatic Life

Polluted water can harm aquatic life. Aquatic plants and animals consume oxygen, and so does the decomposing organic waste that humans dump in the water. **Biochemical oxygen demand (BOD)** is the amount of oxygen required by aquatic bacteria to decompose a given load of organic waste.

If too much waste is discharged into bodies of water, the water becomes oxygen starved, and fish die. This can occur when bodies of water become loaded with municipal sewage or industrial waste. The sewage and industrial pollutants consume so much oxygen that the water can become unlivable for normal plants and animals, creating a "dead" stream or lake.

Similarly, when runoff carries fertilizer from farm fields into streams or lakes, the fertilizer nourishes excessive aquatic plant production – a "pond scum" of algae – that consumes too much oxygen. Either type of pollution – waste dumping or fertilizer runoff – reduces the normal oxygen level, threatening aquatic plants and animals. The result is a reduction of **biological diversity**, or **biodiversity** for short, which is the variety of species in a specific place or on Earth as a whole.

Point Source & Nonpoint Source Pollution

The sources of pollution can be divided into point sources and nonpoint sources. **Point source pollution** enters a body of water at a specific location, whereas **nonpoint source pollution** comes from a large, diffuse area. Point source pollutants are usually smaller in quantity and much easier to control than nonpoint source pollutants.

Point Source Pollution. Point source water pollution originates from a specific point, such as a pipe from a wastewater treatment plant. The two main point sources of water pollution are manufacturers and municipal treatment plants. Many factories use water for cooling and then discharge the warm water back into a river or lake. Fish adapted to cold water, such as salmon and trout, might not be able to survive in the warmer water. Steel, chemicals, paper products, and food processing are major industrial polluters of water.

In developed countries, sewers carry wastewater from sinks, bathtubs, and toilets to a municipal treatment plant, where most – but not all – of the pollutants are removed. The treated wastewater is then typically dumped back into a river or lake. Since passage of the U.S. Clean Water Act and equivalent laws in other developed countries, most treatment plants meet high water-quality standards.

In developing countries, sewer systems are rare, and wastewater usually drains, untreated, into rivers and lakes (Figure 14-43). The drinking water, usually removed from the same rivers, may be inadequately treated as well. The combination of untreated water and poor sanitation makes drinking water deadly in developing countries. Waterborne diseases such as cholera, typhoid, and dysentery are major causes of death.

Nonpoint Source Pollution. Nonpoint sources usually pollute in greater quantities and are much harder to control than point sources of pollution. The principal nonpoint source is agriculture. Fertilizers and pesticides spread on fields to increase agricultural productivity are carried into rivers and lakes by irrigation systems or natural runoff. Expanded use of fertilizer and pesticides may help us avoid a global food crisis in the short term, but application of those products destroys aquatic life by polluting rivers and lakes.

▲ **FIGURE 14-43 WATER POLLUTION, VIETNAM** In the absence of sewers, waste in Ho Chi Minh City, Vietnam, is dumped into the Saigon River. Sanitation workers on boats try to remove the trash from the river.

One of the world's most extreme instances of nonpoint water pollution is the Aral Sea in the former Soviet Union, now divided between the countries of Kazakhstan and Uzbekistan. The Aral Sea was once the world's fourth-largest lake, but it has shrunk to less than 10 percent of its former size (Figure 14-44). When it had control of the Aral Sea, the Soviet Union diverted the waters into canals to irrigate nearby cotton fields. As the sea dried up, wind carried the dust generated from the exposed seabed into the nearby farm fields, as seen in Figure 14-44c. The dust, enriched with fertilizers and pesticides from the nearby fields, as well as the increasingly salty remaining seawater, poses health hazards for nearby residents.

Pause & Reflect 14.3.2 How might a change in the sources of energy used in factories help improve water quality?

(a) 1990 **(b)** 2000 **(c)** 2020

▲ **FIGURE 14-44 DISAPPEARING ARAL SEA** (a) 1990, (b) 2000, (c) 2020.

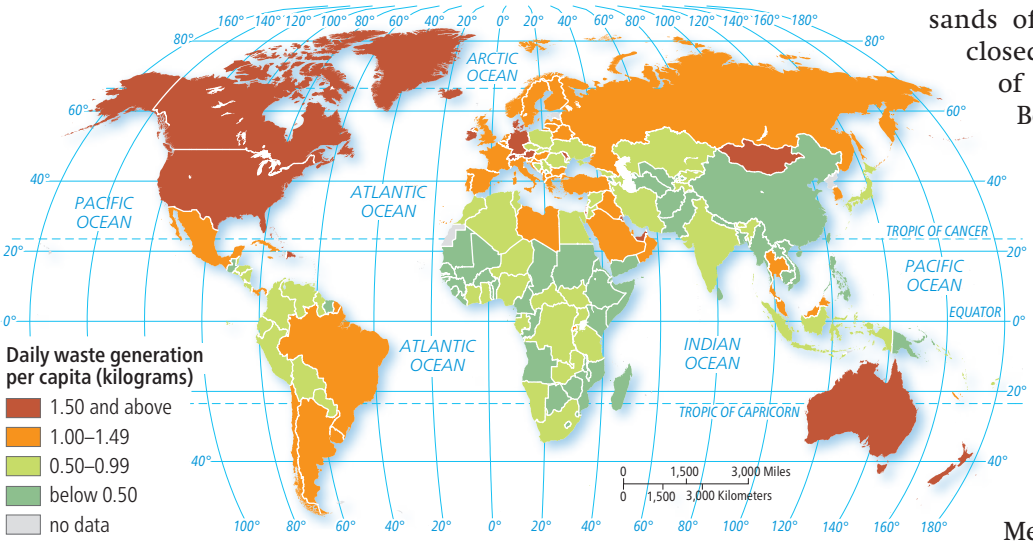
Solid Waste Pollution

Learning Outcome 14.3.3 Describe principal strategies of reducing solid waste pollution.

As people acquire more material goods, they generate more solid waste. The average American generates about 2.2 kilograms (5 pounds) of solid waste per day.

People in developed countries generate more than twice as much solid waste than people in developing countries (Figure 14-45). Per capita solid waste disposal in the United States is three times the worldwide average (Figure 14-46). Overall in developed countries, residences generate around 60 percent of the solid waste and businesses 40 percent. Paper products, such as corrugated cardboard and newspapers, account for the largest share of solid waste in the United States, especially among residences and retailers. Manufacturers discard large quantities of metals as well as paper.

FIGURE 14-45 SOLID WASTE GENERATION BY COUNTRY



Sanitary Landfills for Solid Waste Disposal

The sanitary landfill is by far the most common strategy for disposal of solid waste in the United States is the **sanitary landfill**, which is a place to deposit solid waste at an isolated site in order to be degraded biologically, chemically, and physically, typically by bulldozing a layer of earth over garbage each day to reduce emissions of gases and odors from the decaying trash. More than half of the country's waste is trucked to sanitary landfills. This strategy is the opposite of our disposal of gaseous and liquid wastes: We disperse air and water pollutants into the atmosphere, rivers, and eventually the ocean, but we concentrate solid waste in thousands of sanitary landfills.

Concentration of garbage in sanitary landfills would seem to eliminate solid-waste pollution, but it may only hide it temporarily. Chemicals released by the decomposing solid waste can leak from landfills into groundwater and contaminate nearby water wells, soil, and streams.

The number of landfills in the United States has declined from 7,683 in 1986 to 1,250 in 2022. Thousands of small-town "dumps" have been closed and replaced by a small number of large regional ones (Figure 14-47). Better compaction methods combined with expansion in the land area of some of the large regional dumps have resulted in increased landfill capacity.

Developed countries, including the United States, send some of their waste to developing countries. For example, in 2021 more than 365 million kilograms (800 million pounds) of plastic waste were sent from the United States to other countries, led by Mexico, Malaysia, India, and Vietnam.

Pause & Reflect 14.3.3 Do you have a sanitary landfill in or near your community? If not, where is the nearest facility?

FIGURE 14-46 SOLID WASTE GENERATION, NEW YORK

FIGURE 14-47 SANITARY LANDFILL San Joaquin County, California.

Plastic Waste

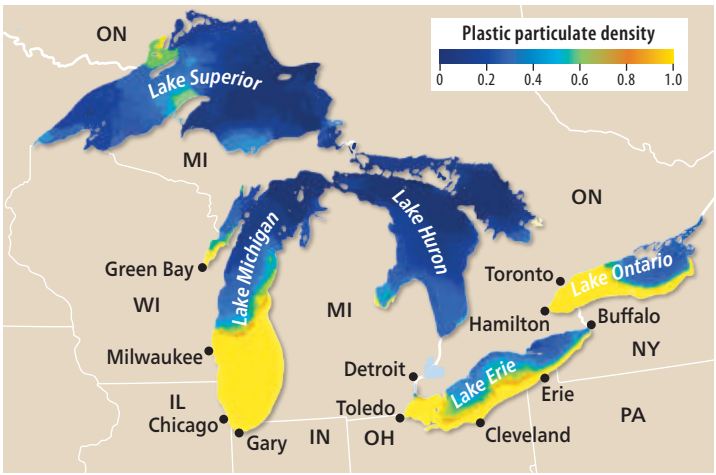
Most plastics are used in manufacturing for a wide variety of products, from cars to computers. Plastics are also used for packaging of other products, notably beverages. All too often, discarded plastic packages flow into bodies of water and wash up on shore.

A major source of plastic waste is water bottles (Figure 14-48). The average American consumes around 156 plastic water bottles per year (3 per week). It takes around 39 liters (10 gallons) of petroleum to produce the 156 plastic bottles consumed by a typical American. That equates to the gasoline burned during a 400-kilometer (250-mile) drive in a typical American vehicle. The average American recycles only one out of six water bottles. The rest are "thrown away" into landfills or into rivers, lakes, and oceans, where they take hundreds of years to disintegrate.

Rochester Institute of Technology scientists Matthew Hoffman and Eric Hittinger measured the amount and spatial distribution of plastic debris dumped into the Great Lakes. Using mathematical modeling and GIS, they calculated that 10,000 metric tons (22 million pounds) of plastic end up in the Great Lakes annually.

The plastic waste is not distributed uniformly through the Great Lakes. Lake Michigan accounted for 52 percent of the plastic debris, Lake Erie 26 percent, Lake Ontario 16 percent, Lake Huron 6 percent, and Lake Superior 0.3 percent (Figure 14-49). The distribution is related to population concentrations as well as distinctive water circulation patterns. Plastic waste discarded in Chicago is trapped at the southern end of Lake Michigan. Lake Erie's plastic debris is clustered near the Detroit River as well as a southern strip originating from Cleveland.

▲ **FIGURE 14-48** DISCARDED WATER BOTTLE POLLUTES A RIVER



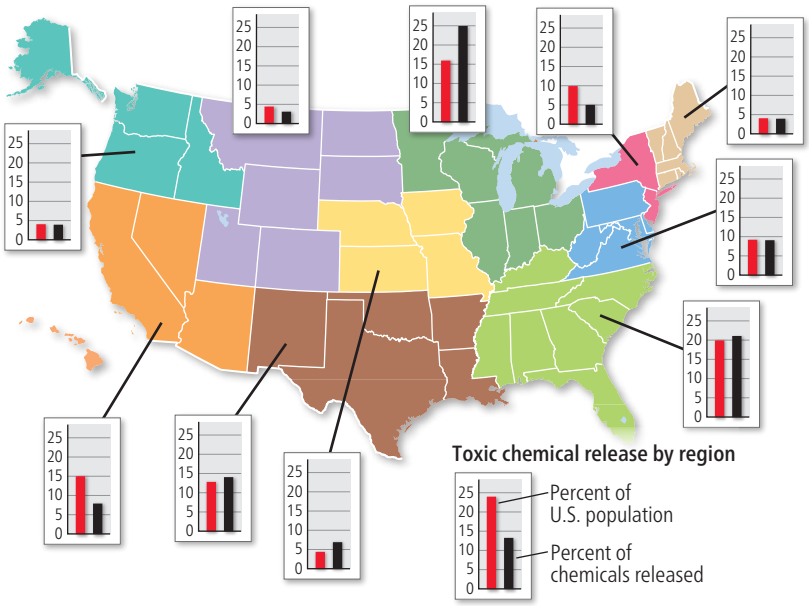
▲ **FIGURE 14-49** DENSITY OF PLASTIC IN THE GREAT LAKES

Hazardous Waste

Disposing of hazardous waste is especially difficult. Hazardous wastes include heavy metals (including mercury, cadmium, and zinc), PCB oils from electrical equipment, cyanides, strong solvents, acids, and caustics. These may be unwanted by-products generated in manufacturing or waste to be discarded after usage.

According to the toxics release inventory published by the U.S. Environmental Protection Agency (EPA), 34.9 million tons of toxic chemicals were released into the land in 2019 at 23,700 facilities in the United States. Most production-related toxics were recycled, treated, or discharged into receptacles other than into land. Mining operations were the largest polluters. The Midwest and Southeast had the largest share of facilities generating toxic releases (Figure 14-50).

If poisonous industrial residuals are not carefully placed in protective containers, the chemicals may leak into the soil and contaminate groundwater or escape into the atmosphere. Breathing air or consuming water contaminated with toxic wastes can cause cancer, genetic mutations, and chronic ailments.



▲ **FIGURE 14-50** TOXIC CHEMICAL RELEASE SITES

KEY ISSUE

14.4 | Why Are Resources Being Protected?

Geography is one part natural science and one part social science. The discipline is especially sensitive to the importance of protecting the natural environment while meeting human needs. **Sustainable development** is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," according to the United Nations. Through sustainable development, humans can improve their quality of life while protecting Earth's resources for the benefit of future generations.

Pollution Reduction Strategies

Learning Outcome 14.4.1 Explain two basic strategies for reducing pollution.

In principle, two basic strategies can reduce pollution:

- Expand the capacity of the environment to accept waste discharges.
- Reduce the amount of waste discharged into the environment.

Both strategies face challenges in being implemented.

Increase the Environmental Capacity for Pollution Discharges

One way to handle pollution is to increase the capacity of the environment to accept pollution discharges. The capacity of air, water, and land to accept waste is not fixed but varies among places and at different times. Adding a particular amount of wastewater to a stream may or may not constitute pollution, depending on the flow of the water. A deep, fast-flowing river has a greater capacity to absorb wastewater than a shallow, slow-moving one. Wastewater can be stored when the river level is low and released when the river is high.

Similarly, exhaust released into stagnant air lingers, whereas exhaust released in windy conditions is quickly dispersed. Industries and utilities reduce local air pollution by building taller smokestacks, which better disperse gases at greater heights.

The environmental capacity for pollution discharge can also be increased by transforming the waste so that it is discharged into a resource that has the capacity to assimilate it. Matter can be transformed among gaseous, liquid, and solid states and discharged into air, water, or land. For example, a coal-burning power plant can discharge gases into the atmosphere, causing air pollution. To reduce air pollution, wet scrubbers are installed to wash particulates from the gas before it is released to the atmosphere. These scrubbers capture the particulates in water, which then can be discharged into a stream. If the stream is polluted by the discharge, then the wastewater can be cleaned in a settling basin where the particulates drop out. This transforms the residue into a solid waste for disposal on land.

Reduce Pollution Discharges into the Environment

Pollution can also be prevented if the amount of waste being discharged into the environment is reduced to a level that the environment can assimilate. Although consumers today purchase more "throwaway" packages than in the past, the packaging material is much less bulky. Glass bottles weigh less today than a generation ago, as do plastic jugs. To reduce manufacturing and shipping costs, companies reduce the bulk of their packaging.

The mix of various inputs in manufacturing can be adjusted to produce a higher ratio of product to waste. For example, gasoline for motor vehicles once contained lead, most of which was discharged through the exhaust pipe, contributing to air pollution. To reduce the generation of lead – once a significant waste – carmakers modified engines so that they operate on unleaded instead of leaded gasoline.

The amount of waste can also be reduced if the production system produces less of the product – or if production ceases altogether – because of lower consumer demand. The creation of fewer products would result in the production of less waste as well. The amount of pollution generated by motor vehicles declined in 2020 compared to earlier years primarily because consumers drove less during the COVID-19 pandemic lockdown.

Emissions-trading systems can reduce discharges, especially into the atmosphere. To reduce sulfur dioxide discharges, the United States introduced an emissions-trading system into the industrial market through an amendment to the 1990 Clean Air Act. In the emissions-trading system, restrictions on the amount of air pollution allowed per industry are set by the EPA, which then permits those allowances to be traded like a commodity on the open market. Power companies can buy and sell allowances to emit sulfur dioxide. Dirty power companies have found it cheaper to install pollution-control devices to reduce pollution and sell some of their allowances. In Canada, Ontario's emissions-reduction trading sets emissions caps and creates a market for trading allowances and credits within the caps.

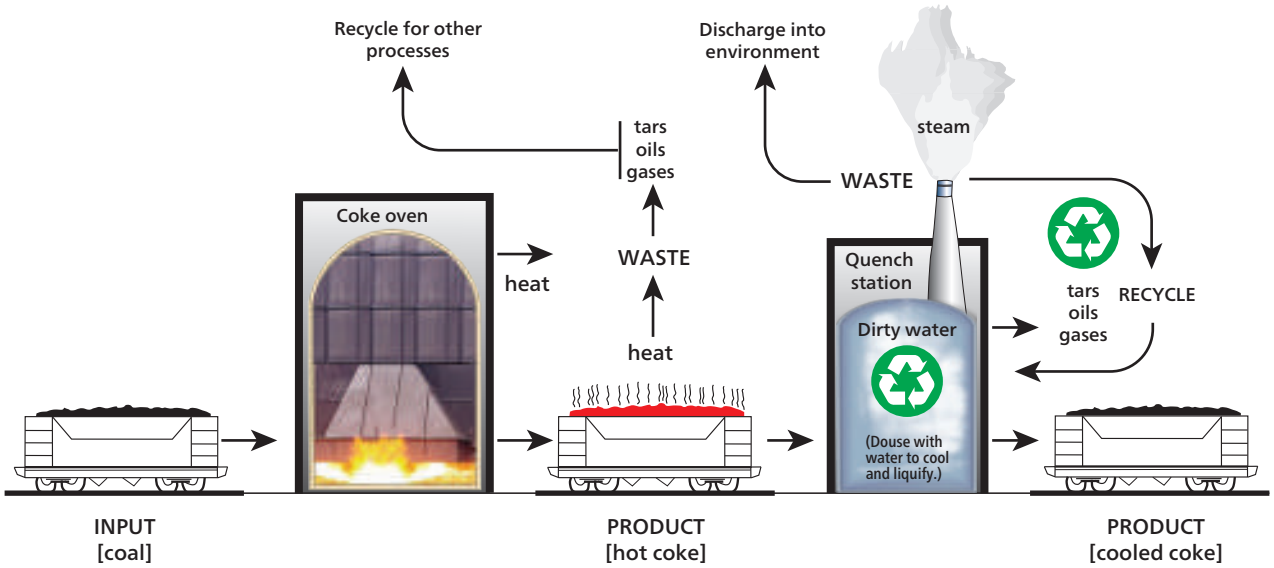
Pause & Reflect 14.4.1 Which strategy—increasing environmental capacity for pollution discharges or decreasing pollution discharges—do you expect to be more successful at reducing pollution? Why?

Comparing Pollution Reduction Strategies

Relying on an increase in the capacity of the environment to accept pollution discharges is risky (Figure 14-51). Because we do not always know the environment's capacity to assimilate a particular waste, we are likely to exceed it at times.

Dispersed wastes may remain harmful. A pollutant like sulfur dioxide might exist at tolerable levels in the air, but it damages trees when it accumulates in the soil. Recent history is filled with examples of wastes discharged into the environment in the belief that they would be dispersed or isolated safely – CFCs in the stratosphere, garbage offshore, and toxic chemicals beneath nearby population centers. Many pollutants are mobile. They often travel from air to soil or soil to water. Tall smokestacks built to reduce sulfur dioxide discharges around coal-burning industries and metal smelters were successful at dispersing sulfur over a larger area (Figures 14-52 and 14-53). But the result of the dispersal was that acid precipitation (containing sulfur) fell hundreds of kilometers away, polluting vegetation and lakes over a wide area there.

In view of the many uncertainties associated with increasing environmental capacity for pollution, reducing discharges into the environment is usually the preferred alternative. Although the environment has the capacity to accept some pollution discharges, consumers must learn to recycle or remanufacture more efficiently. At the same time, consumers must learn to waste less. With careful management, we can enjoy the benefits of both industrial development and a cleaner, safer environment.



▲ **FIGURE 14-51 COMPARING POLLUTION REDUCTION STRATEGIES** A coking plant, used for steelmaking, illustrates the application of principal alternatives for reducing pollution. The main input into a coking plant is a mixture of coal types, and the intended product is coke, which becomes an input in steel production. The coal is placed in a coke oven and cooked at very high temperatures to form coke. Four unwanted by-products result—gases, tars, oils, and heat. Discharging the heat into the environment can cause air pollution. To reduce air pollution from the heat, a coking plant increases the capacity of the environment to accept discharges in two ways. First, the hot coke is taken to a quench station and doused with water to cool it. This process transforms the residual (hot gas) into a liquid (dirty water) as well as another gas (steam). In this way, the waste is transformed and discharged into different parts of the environment. Then the steam is discharged into the environment from a tall smokestack, an example of making more efficient use of whatever initially received the discharge (air). The coking plant also minimizes pollution by reducing discharges. The dirty water produced at the quench station is reused to cool more hot coke, an example of recycling in the same production process. Meanwhile, the three unwanted by-products from the coke oven (other than heat)—gases, tars, and oils—are captured and sold to other companies for recycling in other processes. The other alternative for reducing discharges—changing the mix of coal used as inputs—is also employed because the amount of gases emitted by the burning of coke varies depending on the mix of coal.

▼ **FIGURE 14-52 NUCLEAR POWER PLANT** Gundremmingen, Germany.

▼ **FIGURE 14-53 CHEMICAL PLANT SMOKESTACKS** Marl Chemical Park, Marl, Germany.

Recycling & Remanufacturing

Learning Outcome 14.4.2 Explain the concepts of recycling and remanufacturing.

The most effective way to discharge less into the environment is to recycle or remanufacture more of the products we do use. **Recycling** is the separation, collection, processing, marketing, and reuse of the unwanted material. **Remanufacturing** is the rebuilding of a product to specifications of the original manufactured product using a combination of reused, repaired, and new parts. Both are increasingly used in industry as ways to promote more sustainable industrial processes.

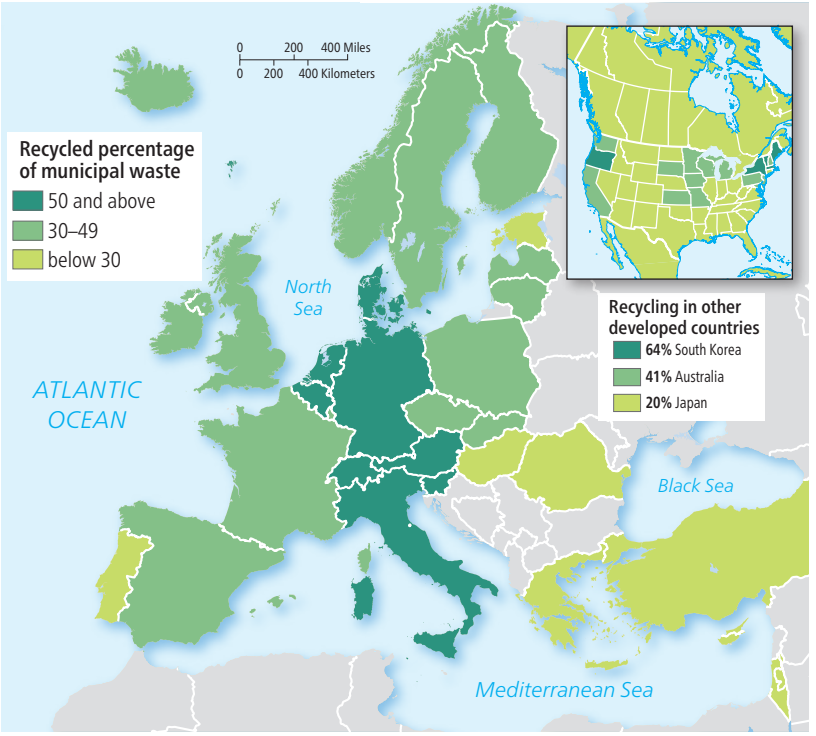
Recycling

Recycling involves the breaking down of the components used in the creation of plastics, papers, aluminum, and glass and preparing the components for use in a future application. Formal programs to encourage recycling are common in developed countries, although rates vary widely (Figure 14-54). Around 67 percent of solid waste in Germany is recycled, but only 20 percent in Japan. Recycling in the United States increased from 10 percent in 1985 to around 32 percent today (Figure 14-55).

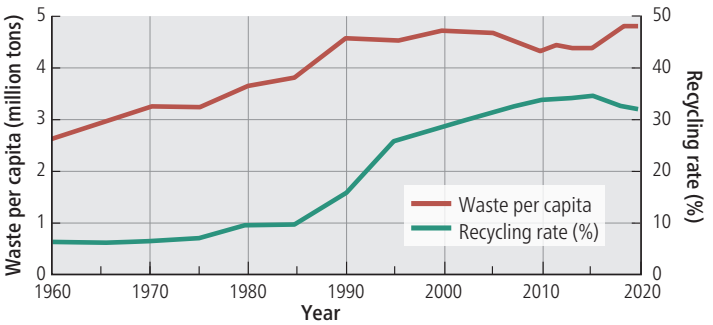
Materials that would otherwise be thrown away are collected and sorted in four principal ways:

- **Curbside programs.** Recyclables can often be placed at the curb in a container separate from the nonrecyclable trash for pickup by a refuse service at a specified time each week. The refuse service usually supplies homes with specially marked containers for the recyclable items.
- **Drop-off centers.** Drop-off centers are sites, typically with several large containers placed at a central location, for individuals to leave recyclable materials. The containers are periodically emptied by a processor or recycler but are otherwise left unattended (Figure 14-56).
- **Buy-back centers.** Commercial operations sometimes pay consumers for recyclable materials, especially aluminum cans but also sometimes plastic containers and glass bottles. These materials are usually not processed at the buy-back center.
- **Deposit programs.** Glass and aluminum containers can sometimes be returned to retailers. The price a consumer pays for a beverage may include a deposit fee of 5¢ or 10¢ that the retailer refunds when the container is returned.

Pause & Reflect 14.4.2 When you have takeout or fast food, are the containers for food and beverages recyclable? Do you and your friends recycle them? If not, what would motivate you to recycling such containers?



▲ **FIGURE 14-54 RECYCLING IN EUROPE AND OTHER DEVELOPED COUNTRIES**
Source: European Environment Agency



▲ **FIGURE 14-55 RECYCLING IN THE UNITED STATES** Since 1990, the percentage of recycling has increased (green line) and the waste generated per person has stayed about the same (red line).
Source: U.S. Environmental Protection Agency

▲ **FIGURE 14-56 BOTTLE DROP-OFF CENTER RECYCLING** Mittweida, Germany.

Remanufacturing

The percentage of materials recovered by recycling varies widely by product (Figure 14-57). Common household items that contain recycled materials include newspapers and paper towels; aluminum, plastic, and glass soft-drink containers; steel cans; and plastic laundry detergent bottles. Materials are manufactured into new products for which a market exists (Figure 14-58).

The principal inputs into manufacturing include recycled paper, plastic, glass, and aluminum. Recycled materials are also used in such industrial applications as recovered glass in roadway asphalt ("glassphalt") and recovered plastic in carpet, park benches, and pedestrian bridges.

Four major manufacturing sectors account for more than half the recycling activity – paper mills, steel mills, plastic converters, and iron and steel foundries.

- **Paper.** Most types of paper can be recycled. Newspapers have been recycled profitably for decades, and recycling of other paper, especially computer paper, is growing. The key to recycling is collecting large quantities of clean, well-sorted, uncontaminated, and dry paper. Rapid increases in the cost of virgin paper pulp are stimulating construction of more plants capable of using waste paper.
- **Plastic.** Plastics are of many types made from a variety of materials that undergo various chemical manipulations. To successfully recycle plastic, different plastic types must not be mixed, as even a small amount of the wrong type of plastic can ruin the melt. Because it is impossible to tell one type of plastic from another by sight or touch, the plastic industry has developed a system of numbers marked inside triangles on the bottom of containers. Types 1 and 2 are commonly recycled and the others generally less frequently.
- **Glass.** Glass can be used repeatedly with no loss in quality and is 100 percent recyclable (Figure 14-59). The process of creating new glass from old is extremely efficient, producing virtually no waste or unwanted byproducts; however, there are drawbacks in recycling glass. Whereas unbroken clear glass is valuable in recycling, mixed-color glass is nearly worthless, and broken glass is hard to sort.
- **Aluminum.** The principal source of recycled aluminum is beverage containers. Aluminum cans began to replace glass bottles for beer during the 1950s and for soft drinks during the 1960s. Aluminum scrap is readily accepted for recycling, in contrast to the other metals that are rarely accepted.

FIGURE 14-57 SOURCES OF SOLID WASTE BEFORE AND AFTER RECYCLING The left side shows the share of different sources of waste. The right side shows the share remaining after some of the waste has been recycled.

Source: U.S. Environmental Protection Agency

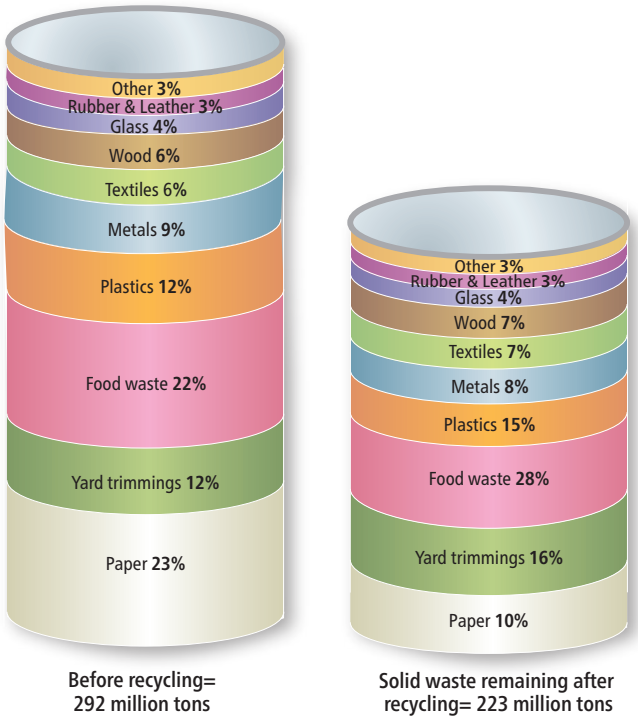
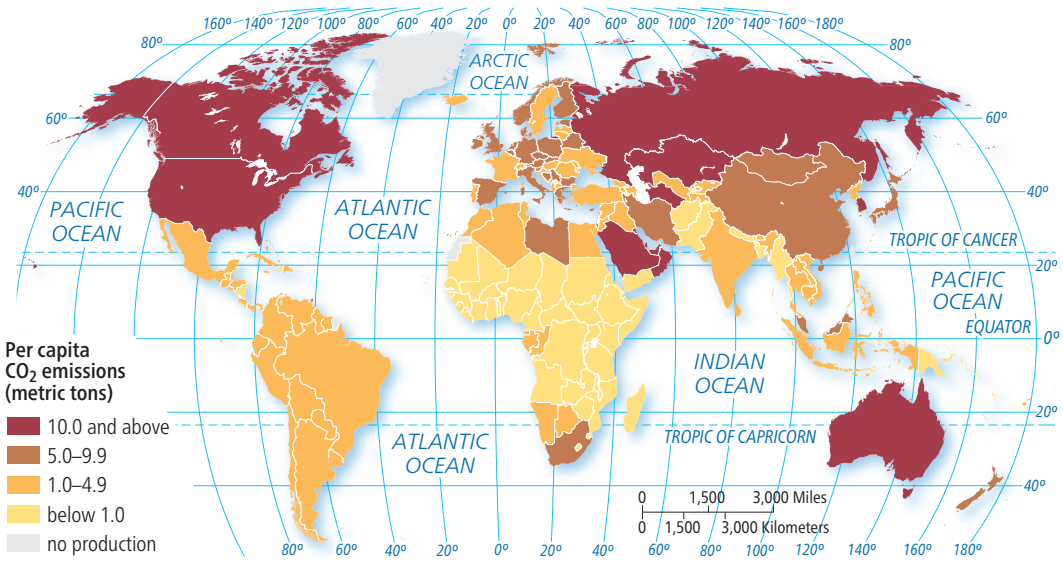


FIGURE 14-58 REMANUFACTURING Making fire heating blocks for building from recycled paper.

FIGURE 14-59 RECYCLING GLASS Pennsylvania.

A More Sustainable Future

Learning Outcome 14.4.3
Describe strategies for reducing pollution and fossil fuel dependency.

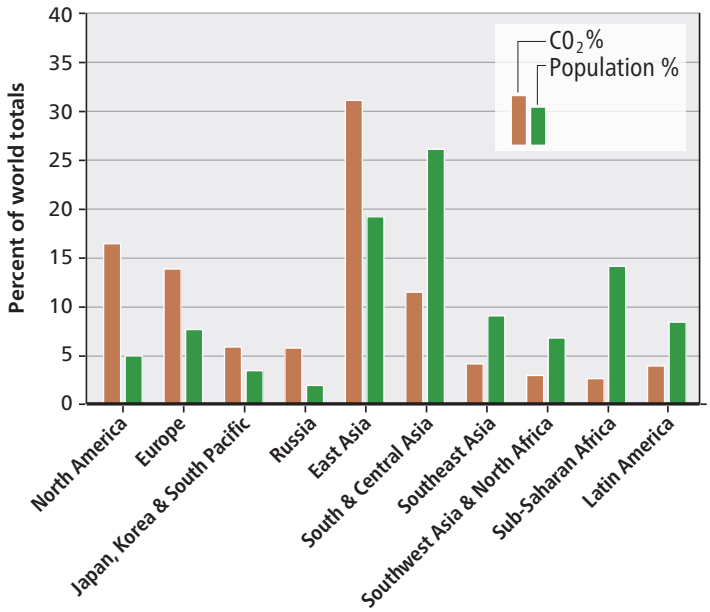


▲ **FIGURE 14-60 CO_2 EMISSIONS PER CAPITA**

Worldwide, the annual per capita emission of carbon dioxide (CO_2) is 7.4 metric tons (16,000 pounds). Annual CO_2 emissions in 2022 reached 18.4 metric tons (40,000 pounds) in the United States compared with only 2.8 metric tons (6,000 pounds) in India (Figure 14-60). The developed countries contain 15 percent of the world's population but are responsible for 37 percent of the world's CO_2 emissions. As hard as it will be for the developed countries to reduce their carbon footprint, the challenge is even greater for developing countries, especially China, which is now the world's leading manufacturing country. East Asia, with 19 percent of the world's population, primarily in China, generates 31 percent of the world's CO_2 emissions (Figure 14-61).

What will it take for the world to reduce pollution and fossil fuel dependency in the years ahead? According to the United Nations, strategies will vary among countries. The U.S. scientists working with the U.N. have fashioned a strategy with three key elements (Figure 14-62):

- Sharp decrease in the use of the three fossil fuels.
- Increase in the use of renewable energy.
- Use of **carbon capture and storage (CCS)**, a process that involves capturing waste CO_2, transporting it to a storage site, and depositing it where it will not enter the atmosphere, normally underground.



▲ **FIGURE 14-61 SHARE OF EMISSIONS AND POPULATION**

▼ **FIGURE 14-62 U.N. TARGET FOR CO_2 EMISSIONS REDUCTION IN THE UNITED STATES** The principal source of reduction would be through decreased use of fossil fuels.

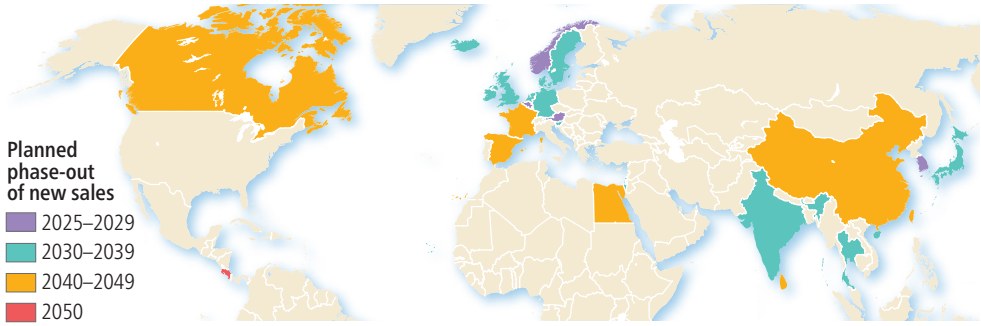
Alternative Fuel Vehicles

The principal impact of a shift away from fossil fuels for many Americans would be reliance on electricity for nearly all household activities and transportation. This electricity would need to be generated through renewable energy sources.

A principal strategy for reducing CO_2 emissions is increased reliance for transportation powered by electricity generated from sources other than the three fossil fuels. Electric-powered vehicles (EVs) comprised only 1 percent of the world's total vehicles, but 13 percent of total sales in 2022 were EVs. However, by 2040, half of new vehicle sales and one-fourth of all vehicles on the road are forecast to be EVs.

▲ **FIGURE 14-63 ELECTRIC VEHICLE CHARGING, LONDON, U.K.** In London, an EV driver who doesn't have a private garage can plug the charger into a street lamppost.

Consumer surveys suggest that the most important drawback to driving an EV is the need for frequent charges (Figure 14-63). Recharging takes much longer than refueling with gasoline, and charging stations are not always conveniently located. In countries where EV use is increasing, more charging stations are being installed, and improved batteries will reduce the frequency and amount of time needed for recharging.



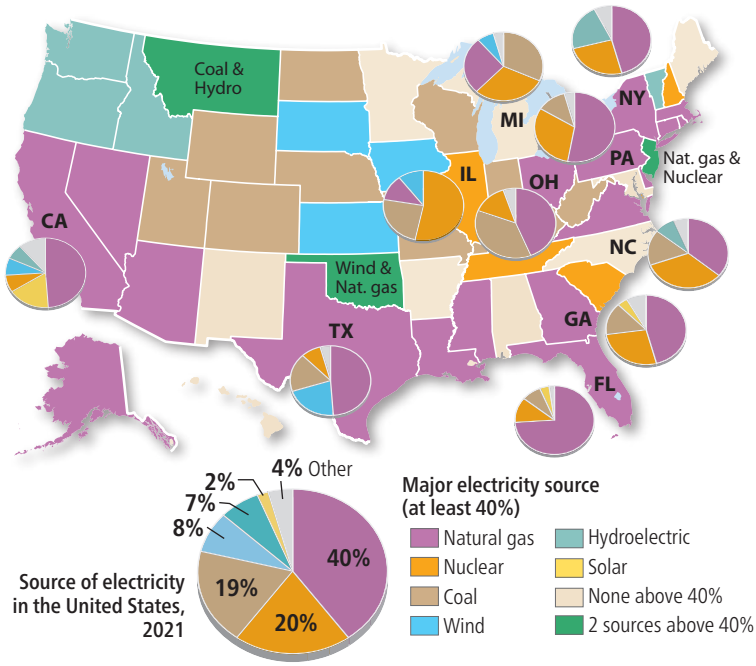
▲ **FIGURE 14-64 PHASE-OUT OF GASOLINE-POWERED VEHICLES**

Ready or not, EVs are set to be the only option for consumers in some countries in the years ahead. Around two dozen countries, mostly in Europe, are phasing out the sale of new gasoline-powered vehicles. Canada, India, and Japan are examples of other countries that are phasing out the sale of new gas cars (Figure 14-64). Within the United States, the sale of vehicles with gas engines will be banned in California and several other states. Most of the national and U.S. state phase-outs are effective between 2030 and 2040.

The source of power for EVs may or may not be sustainable. Although fossil fuel is not being pumped directly into the tank of the EV, fossil fuel may still be consumed by it indirectly if the electricity at the EV charging station comes from a fossil fuel power plant.

The United States in 2021 generated around 41 percent of its electricity from power plants burning natural gas, 19 percent from coal-burning power plants, 20 percent from nuclear power plants, and 20 percent from renewable energy sources. An EV does reduce consumption of an increasingly scarce and expensive resource – petroleum. If the electricity is generated by coal, an EV may cause more air pollution than a gas car. However, the share of electricity generated by coal has decreased rapidly in the United States, from 33 percent in 2015 to 19 percent in 2021, whereas the shares generated by natural gas and renewable sources have increased.

Electricity is generated differently among the 50 U.S. states, and fuel sources are changing rapidly. Coal was the leading source of electricity in 11 states in 2021, compared with 19 states in 2015. In Oregon and Washington State, where hydroelectric power is the leading source of electricity, recharging EVs has a much lower impact on air quality than is the case in Kentucky, Missouri, West Virginia, and Wyoming, where coal is the leading source of electricity. Thus, the "greenest" vehicle varies by location. But the rapid decline in the use of coal to generate electricity means that in most states EVs generate fewer emissions than gas cars (Figure 14-65).



▲ **FIGURE 14-65 ELECTRICITY BY U.S. STATE**

Pause & Reflect 14.4.3 Are you cheered or saddened by the imminent demise of gasoline-powered vehicles? Why?

Key Issues in Human Geography: Culture

Learning Outcome 14.4.4 Review key issues in the cultural elements of human geography.

This book has focused on two features of human behavior—culture and economy. The first half of the text explains why the most important cultural features, such as languages, religions, and ethnicities, are arranged as they are across Earth.

CHAPTER 1 This Is Geography

KEY ISSUE 1.1 | Why Is Geography a Science? Geography is the study of where people and activities are found on Earth's surface and the reasons why they are found there. Geography's most important reference tool is the map. Contemporary mapping utilizes electronic technologies, such as GPS and GIS (Figure 14-66).

KEY ISSUE 1.2 | Why Is Every Place Unique? Every place and region is in some respects unique.

KEY ISSUE 1.3 | Why Are Different Places Similar? Geographers explain why all locations are interrelated through the concepts of scale (the relationship between the portion of Earth being studied and Earth as a whole), space (the physical gap between two objects), and connection (relationships among people and objects across the barrier of space).

KEY ISSUE 1.4 | Why Are Different Places Connected? Distinctive to geography is the importance given to connections between human activities and the physical environment. Some human activities are sustainable, but others are not.

▲ **FIGURE 14-66 THIS IS GEOGRAPHY** Students in Athens, Greece, calculate the Earth's circumference.

CHAPTER 2 Population & Health

KEY ISSUE 2.1 | Where Are People Distributed? The world's population is highly clustered in four regions: East Asia, South Asia, Southeast Asia, and Europe.

▲ **FIGURE 14-67 POPULATION & HEALTH** Awaiting COVID-19 test, United Kingdom.

KEY ISSUE 2.2 | Why Is Population Increasing? Every country is in a stage of the demographic transition, which has four stages characterized by varying rates of births, deaths, and natural increase.

KEY ISSUE 2.3 | Why Does Health Vary by Regions? Health care and medical facilities vary sharply between developed and developing countries (Figure 14-67).

KEY ISSUE 2.4 | Why Might Population Change in the Future? Neo-Malthusians argue that population is outstripping resources, but others do not agree, and during the twenty-first century birth rates have been declining.

CHAPTER 3 Migration

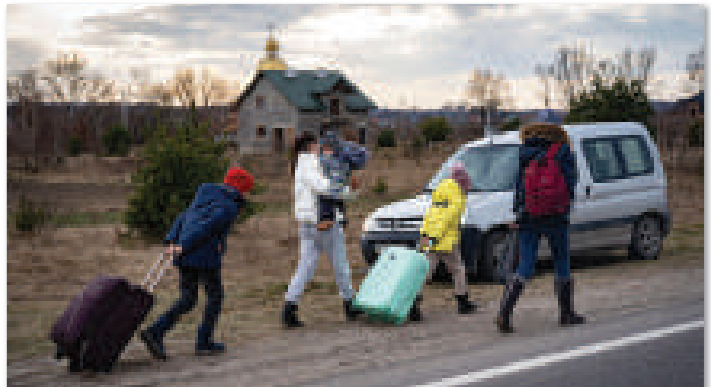
KEY ISSUE 3.1 | Where Are Migrants Distributed? Migration, which is the permanent move to a new location, can be international (voluntary or forced) or internal (interregional or intraregional).

KEY ISSUE 3.2 | Where Do People Migrate Within Countries? Large countries, such as the United States, may experience substantial interregional migration. Intraregional migration is primarily from rural to urban areas in developing countries and from cities to suburbs in developed countries.

KEY ISSUE 3.3 | Why Do People Migrate? People migrate for a combination of political, environmental, and economic push and pull factors (Figure 14-68).

KEY ISSUE 3.4 | Why Do Migrants Face Challenges? Immigration is tightly controlled by most countries. Americans and Europeans are divided on attitudes toward immigrants.

▼ **FIGURE 14-68 MIGRATION** Ukrainian refugees fleeing Russia's invasion.



CHAPTER 4 Culture & Social Media

KEY ISSUE 4.1 | Where Are Cultural Activities Distributed? Folk culture and popular culture have distinctive patterns of origin, diffusion, and distribution.

KEY ISSUE 4.2 | Why Might Culture Diffuse? Regional variations in folk culture can derive from the physical environment as well as from religion and other cultural values. Preferences in popular culture vary more in time than in place.

KEY ISSUE 4.3 | Why Is Access to Culture Unequal? Contemporary popular culture diffuses primarily through electronic media.

KEY ISSUE 4.4 | Why Do Cultures Face Sustainability Challenges? Folk culture faces loss of traditional values in the face of rapid diffusion of popular culture. Popular culture can produce uniform landscapes.

CHAPTER 5 Languages

KEY ISSUE 5.1 | Where Are Languages Distributed? Languages are classified as institutional, stable, and endangered, and they are organized into language families.

KEY ISSUE 5.2 | Why Do Languages Diffuse? Individual languages such as English have documented places of origin and patterns of diffusion.

KEY ISSUE 5.3 | Why Do Languages Vary Among Places? A dialect is a regional variation of a language. Some countries more peacefully embrace multiple languages than do others (Figure 14-69).

KEY ISSUE 5.4 | Why Do Languages Survive or Perish? Many languages have become extinct, but some endangered languages are being preserved and protected.

▼ **FIGURE 14-69 LANGUAGES** Sign language, South Africa school.

CHAPTER 6 Religions

KEY ISSUE 6.1 | Where Are Religions Distributed? Religions can be classified into three large universalizing religions, three large ethnic religions, and other religions. Each has a distinctive spatial distribution.

KEY ISSUE 6.2 | Why Do Religions Have Distinctive Distributions? Universalizing religions have well-documented places of origin, and typically diffuse widely, whereas ethnic religions typically have unknown or unclear origins.

KEY ISSUE 6.3 | Why Do Religions Organize Space in Specific Patterns? Religious structures, such as churches and mosques, are prominent features of the landscape (Figure 14-70).

KEY ISSUE 6.4 | Why Do Territorial Conflicts Arise Among Religious Groups? Some religious groups may come into conflict with governments, social values from other regions of the world, or with other religions.

▲ **FIGURE 14-70 RELIGIONS** Interfaith prayer service, San Diego.

CHAPTER 7 Ethnicities

KEY ISSUE 7.1 | Where Are Ethnicities Distributed? Ethnicity, race, and nationality are distinctive concepts that are frequently confused with each other.

KEY ISSUE 7.2 | Why Do Ethnicities Have Distinctive Distributions? Ethnicities may occupy distinctive places because of a legacy of segregation or forced migration.

KEY ISSUE 7.3 | Why Do Ethnicities & Nationalities Differ? Lack of correspondence between ethnicities and nationalities is widespread in the world.

KEY ISSUE 7.4 | Why Do Ethnic Cleansing & Genocide Occur? Many places have suffered from ethnic cleansing or genocide.

Key Issues in Human Geography: Economy

Learning Outcome 14.4.5 Review key issues in the economic elements of human geography.

The second half of the text looks at the distribution of the most important economic activities.

CHAPTER 8 Political Geography

KEY ISSUE 8.1 | Where Are States Distributed? The world is divided into approximately 200 sovereign states, all but a handful of states are members of the United Nations.

KEY ISSUE 8.2 | Why Are States Challenging to Create? Much of Earth's surface was once organized into city-states, empires, kingdoms, and colonies but is now organized into nation-states (Figure 14-71).

KEY ISSUE 8.3 | Why Do States Have Distinctive Geographic Structure? States have distinctive shapes, and they are separated by boundaries.

KEY ISSUE 8.4 | Why Do States Face Threats? The governance of states can be classified as democratic, anocratic, or autocratic. States have been threatened by terrorism.

▲ **FIGURE 14-71 POLITICAL GEOGRAPHY** Voting in South Africa.

CHAPTER 9 Development

KEY ISSUE 9.1 | Why Does Development Vary Among Countries? The level of development of each country is measured through the Human Development Index (HDI).

KEY ISSUE 9.2 | Where Are Inequalities in Development Distributed? The Inequality-adjusted HDI measures the extent of inequality in a country, and the Gender Development Index (GDI) and the Gender Inequality Index (GII) measure the extent of inequality between men and women.

KEY ISSUE 9.3 | Why Do Countries Face Development Challenges? Two paths to development are self-sufficiency and international trade.

KEY ISSUE 9.4 | Why Are Countries Able to Make Progress in Development? Progress has been made in achieving development in most regions, but substantial gaps in performance between developed and developing countries persist.

CHAPTER 10 Food & Agriculture

KEY ISSUE 10.1 | Why Do People Consume Distinctive Foods? Most food is consumed in the form of cereal grains, especially wheat, rice, and maize.

KEY ISSUE 10.2 | Where Did Agriculture Originate? Agriculture was invented in multiple hearths beginning approximately 10,000 years ago.

KEY ISSUE 10.3 | Where Is Agriculture Distributed? Agriculture can be divided into 11 major regions, including five subsistence and six commercial regions.

KEY ISSUE 10.4 | Why Do Farmers Face Sustainability Challenges? Agriculture is challenged to produce more food while preserving resources for the future.

CHAPTER 11 Industry

KEY ISSUE 11.1 | Where Are Industries Located? The world's three principal industrial regions are Europe, North America, and East Asia.

KEY ISSUE 11.2 | Why Are Site Factors Important for Industries? Site factors are related to the costs of production inside a factory, including labor, capital, and land (Figure 14-72).

KEY ISSUE 11.3 | Why Are Situation Factors Important for Industries? Situation factors involve transporting inputs into a factory and manufactured goods to markets.

KEY ISSUE 11.4 | Why Has the Distribution of Industries Changed? Industry is increasing in some developing countries and in some areas within developed regions.

▼ **FIGURE 14-72 INDUSTRY** Textile factory, Bangladesh.

CHAPTER 12 Settlements & Services

KEY ISSUE 12.1 | Where Are Settlements & Services Distributed? Rural and urban settlements are home to most of the world's population. Settlements are centers for consumer, business, and public services (Figure 14-73).

KEY ISSUE 12.2 | Why Do Services Cluster in Settlements? Rural settlements, which specialize in agricultural services, may be dispersed or clustered, and urban settlements were established in ancient times as service centers.

KEY ISSUE 12.3 | Where Are Business Services Distributed? Business services cluster in global cities. Many communities specialize in the provision of particular services that constitute a community's economic base.

KEY ISSUE 12.4 | Where Are Consumer Services Distributed? A central place is surrounded by a market area that has a range and a threshold. Market areas of varying sizes nest and overlap.

▲ **FIGURE 14-73 SETTLEMENTS & SERVICES** Consumer services, Mexico City.

CHAPTER 13 Urban Patterns

KEY ISSUE 13.1 | Why Are Urban Settlements Challenging to Define? Geographers have constructed various definitions to portray the growth and extent of cities. Services, especially business and public services, cluster downtown, known as the central business district.

KEY ISSUE 13.2 | Where Are People Distributed Within the Cities of Developed Countries? Several models have been created to describe where different people tend to cluster within urban areas, including the concentric zone, sector, and multiple nuclei.

KEY ISSUE 13.3 | Where Are People Distributed Within the Cities of Developing Countries? Cities in developing countries also show evidence of concentric zones, sectors, and multiple nuclei, although the distribution of social groups may vary from the patterns found in developed countries (Figure 14-74).

KEY ISSUE 13.4 | Why Might Urban Settlements Be More Sustainable? The rapid growth of cities has relied on evolving forms of transportation. Within cities are contrasts between areas of prosperity and areas of hardship.

▲ **FIGURE 14-74 URBAN PATTERNS** Sitabuldi market, Nagpur, India.

CHAPTER 14 Resource Challenges

KEY ISSUE 14.1 | Where Are Energy Resources Distributed? Energy is derived primarily from three fossil fuels: coal, natural gas, and petroleum. Neither the supply nor the demand for these resources is uniformly distributed.

KEY ISSUE 14.2 | Why Might We Rely More on Alternative Energy Sources? The three fossil fuels are nonrenewable, whereas other increasingly important energy resources are renewable (Figure 14-75).

KEY ISSUE 14.3 | Why Are Resources Being Polluted? Pollution occurs when more waste is added to a resource than it can accommodate.

KEY ISSUE 14.4 | Where Are Resources Being Protected? Sustainable development can be achieved through preservation and conservation of resources.

▼ **FIGURE 14-75 RESOURCE CHALLENGES** Installing solar energy system, Hemis Monastery, Ladakh, India.

Conclusion: Revisiting Geography's Key Concepts

Learning Outcome 14.4.6 Apply geography's five key concepts to two countries.

To conclude the chapter on resources as well as the entire study of human geography, we return to the five key concepts introduced at the beginning of the book – place, region, scale, space, and connection. We can apply the five concepts to understand resource challenges facing two small countries – Luxembourg and Timor-Leste.

Every Location Is Unique

Geographers refer to place and region to explain why every location on Earth is in some ways unique. A place is a specific point on Earth distinguished by a particular characteristic. A region is an area of Earth defined by one or more distinctive characteristics.

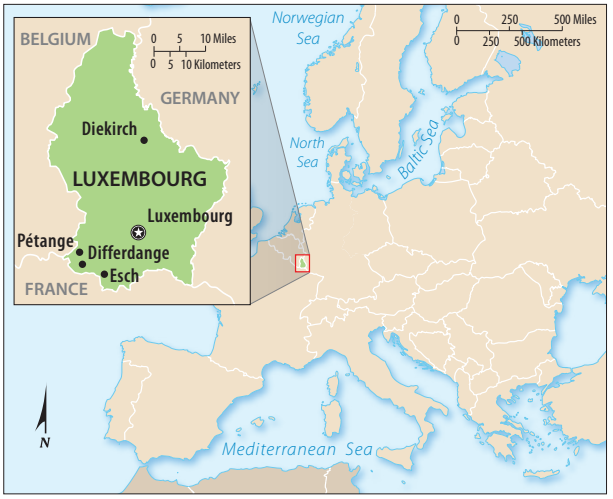
Place. Luxembourg and Timor-Leste are small countries located on bodies of water that face pollution challenges. Timor-Leste, an island situated between the Savu Sea and the Timor Sea (Figure 14-76), struggles with ensuring its population access to clean water and sanitation. According to the U.N., 70 percent of Timor-Leste's water sources are contaminated with microbiological entities, often holding potential for spreading diseases such as typhoid and cholera. Contaminations such as these are partly the result of a lack of effective sewage systems. Offshore protected areas have been established in recent years to preserve the biodiversity of aquatic life, which support local fisheries and tourism. The Alzette River, which flows through Luxembourg (Figure 14-77), has been polluted by spillages of wastewater and chemicals from farms. But the country has elaborate policing and cleanup procedures that minimize the damage.

Region. Timor-Leste is part of the region of Southeast Asia (Figure 14-78). The region's many low-lying islands are exposed to a range of impacts from global climate change, especially rising seas and increased flooding. Luxembourg is part of the region of Europe (Figure 14-79). The region's resource problems include acid precipitation from the burning of fossil fuels (refer to Figure 14-38), dependency on foreign sources of fossil fuels (refer to Figure 14-12), and reliance on nuclear fuel (refer to Figure 14-22).

▼ **FIGURE 14-76 PLACE: TIMOR-LESTE** A massive statue called Cristo Rei (Christ the King) towers over the coast.

▼ **FIGURE 14-77 PLACE: LUXEMBOURG** The Alzette River flows through the center of Luxembourg.

▲ **FIGURE 14-78 REGION: TIMOR-LESTE** Timor-Leste is in Southeast Asia.



▲ **FIGURE 14-79 REGION: LUXEMBOURG** Luxembourg is in Europe.

All Locations Are Interrelated

Geographers refer to scale, space, and connection to explain why all locations are interrelated. Scale is the relationship between the portion of Earth being studied and Earth as a whole. Geographers observe that many objects are distributed across space in a regular manner. Connection refers to relationships among people across the barrier of space.

Scale. Climate change, including increasing temperatures, increasing rainfall, and rising sea levels, poses challenges for Timor-Leste, a developing country that relies on climate stability for its agricultural-based economy (Figure 14-80). Timor-Leste must find ways to minimize the loss of agricultural land from the extreme flooding and landslides that come with climate change and attempt to reduce poverty and hunger through sustainable management practices that conserve agricultural land. Luxembourg is a developed country, with one of the world's highest incomes per capita. One of the world's most prominent international organizations, the European Union, has many of its offices in Luxembourg (Figure 14-81).

Space. The space, or gap, between places can be minimal or substantial. In Timor-Leste, the gap is only 40 kilometers between its capital Dili at sea level and the country's highest elevation, Mount Ramelau (Figure 14-82), at 3,000 meters. In Luxembourg, the gap is 75 kilometers between the capital Luxembourg City at an elevation of 400 meters and the country's highest elevation of 560 meters near the town of Clervaux (Figure 14-83). In reality, the 40-kilometer gap is more substantial in Timor-Leste than is the 75-kilometer gap in Luxembourg. In a developed country like Luxembourg, with good roads and train service, Clervaux can be reached in less than an hour from the capital, whereas to travel from Dili to Mount Ramelau requires a 3-hour drive followed by a 5-hour hike. In both countries, the mountains are a resource to be preserved rather than utilized.

Connection. Although Luxembourg has one of the world's highest incomes per capita and Timor-Leste has one of the world's lowest incomes per capita, they share a similar form of connection to the rest of the world. Both countries possess international airports (Figures 14-84 and 14-85). And their international airports mean that both countries contribute more to global air pollution than they would otherwise. Air travel is responsible for 3 percent of the world's CO_2 emissions.

FIGURE 14-80
SCALE: TIMOR-LESTE Market in Timor-Leste.

FIGURE 14-81
SCALE: LUXEMBOURG European Union offices in Luxembourg City, the capital of Luxembourg.

FIGURE 14-82
SPACE: TIMOR-LESTE Mount Ramelau, Timor-Leste's highest elevation.

FIGURE 14-83
SPACE: LUXEMBOURG Clervaux, near Luxembourg's highest elevation.

FIGURE 14-84
CONNECTION: TIMOR-LESTE Plane flies over Dili.

FIGURE 14-85
CONNECTION: LUXEMBOURG Plane files over Luxembourg City.

14 Summary & Review

KEY ISSUE

14.1 | Where Are Energy Resources Distributed?

- Most energy comes from three fossil fuels—petroleum, coal, and natural gas.
- Fossil fuels are nonrenewable and are not distributed uniformly across Earth.
- Demand for fossil fuels is relatively high in developed countries.

KEY ISSUE

14.2 | Why Might We Rely More on Alternative Energy Sources?

- Nuclear power is an alternative to fossil fuels because a large amount of energy is released from a small amount of material.
- Renewable energy sources are increasingly important, especially hydroelectric, wind, and solar.

KEY ISSUE

14.3 | Why Are Resources Being Polluted?

- Waste—the unwanted by-products of using resources—are discharged to air, water, and land.
- Pollution occurs when more waste is discharged than can be accommodated in the air, water, or land.

KEY ISSUE

14.4 | Where Are Resources Being Protected?

- Sustainable development conserves resources for future generations and preserves biodiversity.
- Sustainable development is promoted through consuming fewer resources and recycling and remanufacturing more of those that are used.

Thinking Geographically

KEY ISSUE

14.1 | Where Are Energy Resources Distributed?

Much of the remaining petroleum is located either offshore or in shale or oil sands that need to be mined. What are some of the pollution challenges to increased use of these sources?

▲ **FIGURE 14CR-1 OIL SANDS MINING, ALBERTA**

KEY ISSUE

14.2 | Why Might We Rely More on Alternative Energy Sources?

What initiatives has your community or state taken to promote alternative sources of energy? What are some of the positive outcomes and some of the challenges in using alternative energy sources?

▲ **FIGURE 14CR-2 WIND TURBINES, PALM SPRINGS, CALIFORNIA**

KEY ISSUE

14.3 | Why Are Resources Being Polluted?

When you throw something away in a trash can, where does it go in your community? What challenges does your community face in handling your trash?

▲ **FIGURE 14CR-3 RECYCLING BINS, BEAVERCREEK, OHIO**

KEY ISSUE

14.4 | Where Are Resources Being Protected?

What initiatives have been undertaken at your university or school to encourage more sustainable development? In what ways might students, teachers, and staff be encouraged to adopt more sustainable practices?

▲ **FIGURE 14CR-4 TRASH AND RECYCLING BINS, SYDNEY, AUSTRALIA**

Key Terms

Acid deposition The accumulation of acids on Earth's surface.

Acid precipitation Conversion of sulfur oxides and nitrogen oxides to acids that return to Earth as rain, snow, or fog.

Active solar energy system A solar energy system that collects energy through the use of mechanical devices such as photovoltaic cells or flat-plate collectors.

Air pollution Concentration of trace substances, such as carbon monoxide, sulfur dioxide, nitrogen oxides, hydrocarbons, and solid particulates, at a greater level than occurs in average air.

Animate power Power supplied by animals or by people.

Biochemical oxygen demand (BOD) The amount of oxygen required by aquatic bacteria to decompose a given load of organic waste; a measure of water pollution.

Biological diversity (or **biodiversity**) The number of species within a specific habitat.

Biomass fuel Fuel derived from wood, plant material, or animal waste.

Carbon capture and storage (CCS) The process of capturing waste carbon dioxide, transporting it to a storage site, and depositing it where it will not enter the atmosphere (normally underground).

Chlorofluorocarbon (CFC) A gas used as a solvent, a propellant in aerosols, and a refrigerant.

Consumptive water usage The use of water that causes it to evaporate rather than return to nature as a liquid.

Demand The quantity of something that consumers are willing and able to buy.

Fossil fuel An energy source formed from the residue of plants and animals buried millions of years ago.

Geothermal energy Energy from steam or hot water produced from hot or molten underground rocks.

Greenhouse effect The anticipated increase in global temperature caused by carbon dioxide (emitted by burning fossil fuels) trapping some of the radiation emitted by Earth's surface in the atmosphere.

Hydraulic fracturing (or **fracking**) Pumping water at high pressure into the ground to break apart rocks and thereby release natural gas.

Hydroelectric power Power generated from moving water.

Nonconsumptive water usage The use of water that is returned to nature as a liquid.

Nonpoint source pollution Pollution that originates from a large, diffuse area.

Nonrenewable resource Something produced in nature more slowly than it is consumed by humans.

Nuclear fission The splitting of an atomic nucleus to release energy.

Nuclear fusion Creation of energy by joining the nuclei of two hydrogen atoms to form helium.

Ozone A gas that absorbs ultraviolet solar radiation in the stratosphere, a zone between 10 and 50 kilometers (6 and 30 miles) above Earth's surface.

Passive solar energy systems Solar energy systems that collect energy without the use of mechanical devices.

Photochemical smog An atmospheric condition formed through a combination of weather conditions and pollution, especially from motor vehicle emissions.

Photovoltaic cell A solar energy cell, usually made from silicon, that collects solar rays to generate electricity.

Point source pollution Pollution that enters a body of water from a specific source.

Pollution Concentration of waste added to air, water, or land at a greater level than can be dispersed by air, diluted by water, or decomposed by land.

Potential reserve The amount of energy in deposits not yet identified but thought to exist.

Preservation The maintenance of resources in their present condition with as little human impact as possible.

Proven reserve The amount of a resource remaining in discovered deposits.

Recycling The separation, collection, processing, marketing, and reuse of discarded material.

Remanufacturing The rebuilding of a product to specifications of the original manufactured product using a combination of reused, repaired, and new parts.

Renewable energy A source of energy that has a theoretically unlimited supply and is not depleted when used by people is renewable energy.

Renewable resource Something produced in nature more rapidly than it is consumed by humans.

Sanitary landfill A place to deposit solid waste at an isolated site in order to be degraded biologically, chemically, and physically, typically by bulldozing a layer of earth over garbage each day to reduce emissions of gases and odors from the decaying trash.

Supply The quantity of something that producers have available for sale.

Sustainable development Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Tidal power The conversion of energy generated by tidal flows into electricity.

International Geographic Mapping Explorations

Renewable Energy Innovations

Innovative initiatives to develop renewable energy can be found around the world. The developed countries of Northern Europe, including Denmark, Iceland, Norway, and Sweden, are world leaders in developing renewable energy. Several Latin American countries are among world leaders in depending on renewable energy, including Costa Rica and Nicaragua, which obtain more than 95 percent of their energy from renewable sources (Figure 14CR-5).

FIGURE 14CR-5 WIND TURBINES ABOVE THE CITY OF SANTA ANA, COSTA RICA

. . . . We have concluded our study of human geography with challenges in the use of Earth's resources, especially issues of depletion of finite resources and pollution of air, water, and land. What will the future bring for you? As we will see in the Afterword, many careers apply geographic concepts learned in this course. . . .

AFTERWORD | Careers in Geography

Where do you see yourself working in 5 or 10 years after graduation? You could be analyzing customer behavior for a major retailer. You could be evaluating the fairness of redistricting plans for a citizens' oversight committee. You could be documenting the migration of refugees for an international relief organization. Or you could be assessing sustainable business practices for an environmental action group.

What do all these careers have in common? Each offers creative ways to apply core concepts and skills of geography. An increasing number of students recognize that geographic education is practical as well as stimulating. Employment opportunities are expanding for students trained in geography, especially in geospatial technologies, teaching, government service, business, and nonprofit organizations.

The Association of American Geographers cites three distinctive features of geography that especially favor increased employment opportunities for geographers:

- Increased dependency in our daily lives on geographic technologies, such as GPS in cell phones and cars and instantaneous online mapping in handheld devices.
- Increased importance of global-scale commonalities and local-scale diversity in cultural features and natural systems across Earth's surface.
- Increased emphasis on interdisciplinary studies in the curriculum of schools and universities.

Geospatial Technologies

In the past 25 years, the field of geospatial technologies has been making rapid advances, thanks to developments in GIScience, such as geographic information systems, geotagging, volunteered geographic information, and remote sensing. "Readily available, consistent, accurate, complete, and current geographic information and the widespread availability and use of advanced technologies offer great job opportunities for people," states the U.S. Department of Labor's Employment and Training Administration website. The number of geospatial technology jobs is increasing by 1,000 per year, according to the Labor Department.

Jobs in Geospatial Technologies

Recent developments in GIS have added powerful capabilities to these systems. GIS can apply artificial intelligence (AI) machine-learning algorithms that use vast amounts of data to produce maps capable of modeling, predicting, classifying, and clustering highly complex phenomena. Some systems even employ real-time data based on input from cell phone users. Applications of spatial data from AI are useful in many fields. For example:

- Law enforcement officials can identify crime "hot spots."
- Ride-sharing companies can more accurately take routes that minimize traffic congestion.
- Transportation planners can generate maps that identify optimal locations for new infrastructure.
- Businesses can better predict demand for products.
- Delivery companies can more efficiently improve the efficiency of supply chains and delivery systems.
- Government officials have better ability to analyze complex datasets that support regional planning initiatives.

Jobs making use of geospatial technologies and GIS can be found in such private- and public-sector areas as environmental consulting, software development, air navigation services (Figure AF-1), spatial database management for mapping companies, location analysis for retailing and real estate, logistical arrangements for the transport of goods, site selection for utilities, and resource management, to name just a few.

Recognizing the increasing importance of GIScience jobs, the U.S. Department of Labor has developed a competency model for what it takes to get a job in the field of geospatial technology. Core competencies include understanding Earth's geometry, using tools such as projections, the Global Navigation Satellite System, remote sensing, cartography, geographic information systems, and geospatial information technology.

▲ **FIGURE AF-1 GEOSPATIAL TECHNOLOGIES** A National Guard member in Springfield, Ohio, provides geospatial information to an officer in Texas providing relief assistance in the aftermath of Hurricane Harvey.

Teaching

Doctoral or master's degrees in geography are offered in around 200 universities in the United States and Canada. A career as a geography teacher is promising because schools are expanding their geography curriculum (Figure AF-2). Educators increasingly recognize geography's role in teaching students about global diversity. AP Human Geography is the fastest-growing AP discipline in U.S. high schools.

Government

Geographers contribute their knowledge of the location of activities, the patterns underlying the distribution of various activities, and the interpretation of data from maps and satellite imagery to local, state, and national governments. Employment opportunities with cities, states, provinces, and other units of local government are typically found in departments of planning, transportation, parks and recreation, economic development, housing, zoning, or other similarly titled government agencies. Geographers may be hired to conduct studies of local economic, social, and physical patterns; to prepare information through maps and reports; and to help plan the community's future.

Many federal government agencies employ geographers:

- The Department of Agriculture hires geographers for the Forest Service and Natural Resources Conservation Service to enhance environmental quality.
- The Department of Commerce hires geographers for the Bureau of the Census to study changing population trends and for the Economic Development Administration to promote rural development.
- The Department of Defense hires geographers for the Defense Intelligence Agency and the National Geospatial-Intelligence Agency to analyze satellite imagery.
- The Department of Energy hires geographers for the Office of Environmental Management to administer environmental protection programs.
- The Department of Homeland Security hires geographers in several of its agencies concerned with transportation and infrastructure security, border protection, and disaster preparation and response.
- The Department of Housing and Urban Development hires geographers to help revitalize American cities.
- The Department of the Interior hires geographers for the U.S. Geological Survey to study land use and create topographic maps, for the Office of Environmental Policy and Compliance to administer environmental protection programs, and for the National Park Service to provide technical services.
- The Department of State hires geographers for foreign service.
- The Department of Transportation hires geographers to plan new transportation projects.

▲ **FIGURE AF-2 TEACHING GEOGRAPHY OUTSIDE THE CLASSROOM**

Business

An increasing number of American geographers are finding jobs with private companies. The list of possibilities is long, but here are some common examples:

- Real estate developers hire geographers to find the best locations for new shopping centers.
- Real estate firms hire geographers to assess the value of properties.
- Supermarket chains, department stores, and other retailers hire geographers to determine the potential markets for new stores.
- Banks hire geographers to assess the probability that a loan applicant has planned a successful development.
- Distributors and wholesalers hire geographers to find ways to minimize transportation costs.
- Transnational corporations hire geographers to predict the behavior of consumers and officials in other countries.
- Manufacturers hire geographers to identify new sources of raw materials and markets.
- Utility companies hire geographers to determine future demand at different locations for gas, electricity, and other services.

For more information on careers in geography, consult the Association of American Geographers website, at aag.org, or the National Council for Geographic Education, at ncge.org.

Nonprofits

Nonprofit organizations and NGOs (non-governmental organizations) advocate for a wide variety of causes and values. Working for a nonprofit or NGO is a way to make a difference

in the world and to change the world in a positive way. Geographers are especially attracted to nonprofits and NGOs that advocate for environmental protection, sustainable resource management, and regeneration of communities.

Citizen Geographers

Regardless of your career, you can practice geography in your daily life. At the very least, you can read—and more importantly—interpret a map on paper or on your electronic device. The maps throughout this book are designed to relate geography to choices we make in our daily lives.

All Citizens Are Geographers

Each of us is a citizen geographer living in a community and making personal choices. We can choose where we obtain our food and our clothing, and the amount of resources we consume and throw away. As citizen geographers living in a country, we can make informed choices about policies and priorities. We see sharp differences in HDI and GII, conflicts between countries, and gerrymandered electoral districts.

Informed citizen geographers can debate policies for declining cities, for regulating migration, for using languages, and for wearing clothing. We citizen geographers can debate whether Malthus was right or wrong, whether GPS tracking devices should be turned on or off, and whether countries should intervene in ethnic conflicts.

We citizen geographers can all work toward conserving a sustainable Planet Earth.

Participatory GIS: YouthMappers

A global network of geography students provides young citizen geographers with experience in applying GIS to realworld problems. YouthMappers is a network of several hundred university-student-led chapters for students to organize and implement mapping activities that respond to issues ranging from disaster planning and relief to poverty and lack of health care. Students in chapters at U.S. universities partner with students elsewhere in the world. To address development challenges around the world, YouthMappers make use of public geospatial technologies, such as the OpenStreetMap platform, discussed in Chapter 1. The United States Agency for International Development provides financial support.

Examples of YouthMappers projects include mapping the distribution of electrical power grids in West Africa, the distribution of food insecurity in rural Ghana, and the distribution of health clinics during the height of the COVID-19 pandemic. The motto of YouthMappers is "we don't just build maps, we build mappers."

Participatory GIS in Africa

Because of the enormous amount of data that can be captured, stored and manipulated by GIS technologies, people able to access them can hold enormous power. Geographers working for the World Bank are exploring the use of participatory GIS (PGIS) as a tool for empowerment of local people who may be otherwise disadvantaged in decision-making processes affecting their future.

An example is the Open Data for Resilience Initiative (OpenDRI) program, which trains citizens in the use of GIS to construct their own maps and 3-D models. OpenDRI is supported by a fund managed by the World Bank called Global Facility for Disaster Reduction and Recovery (GFDRR), which supports disaster risk management projects worldwide.

The Zanzibar Mapping Initiative, one of the OpenDRI projects funded by the World Bank, is using drones to map the entire 3,500-square-kilometer (1,400-square-mile) islands of Zanzibar and Pemba (Figure AF-3). This is one of the largest areas ever mapped using small relatively affordable drones instead of expensive satellite technology.

The Zanzibar initiative contains 102 layers of geospatial data for use in environmental monitoring and risk assessment. These data can assist local governments in preparing for natural hazards resulting from climate change. Training citizens in these and other geographic tools help communities to prepare for disasters such as flooding and to accurately monitor environmental conditions and community property rights. Information is made freely available with online tools, allowing open access to data concerning natural hazards.

More importantly, by making these geospatial technologies available to more users than only technical specialists, individual citizens become empowered to exercise more democratic control over their lives and to be more engaged in decisions that directly affect their lives.

▲ **FIGURE AF-3** **DRONE OVER PAJA BEACH, ZANZIBAR**

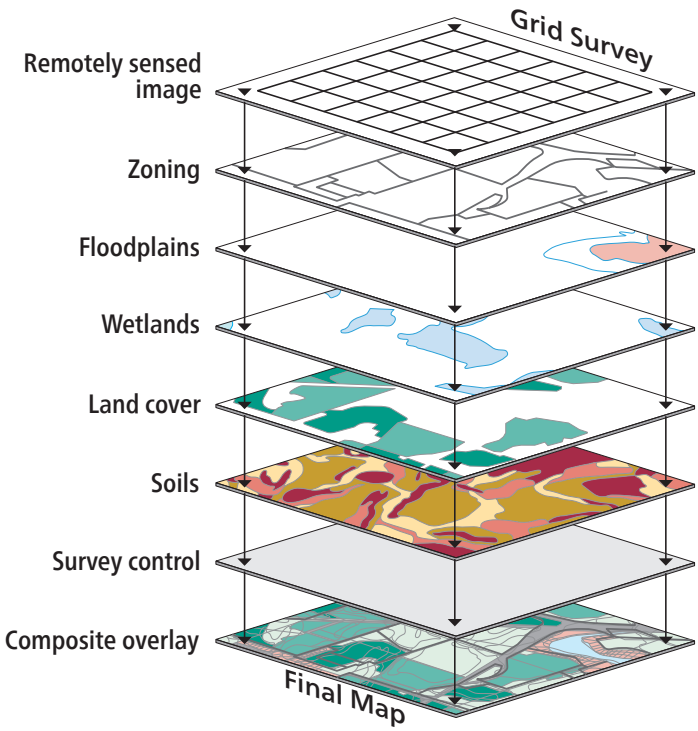
APPENDIX | Map Scale and Projections

PHILLIP C. MUEHRCKE

Today, user-friendly mapping software enables anyone with a computer to produce maps at a range of scales using a variety of projections. But a challenge remains to geographers and other users of spatial information: how to organize and present in map form the vast amounts of spatial data that are now available.

Geospatial Technologies & GIS

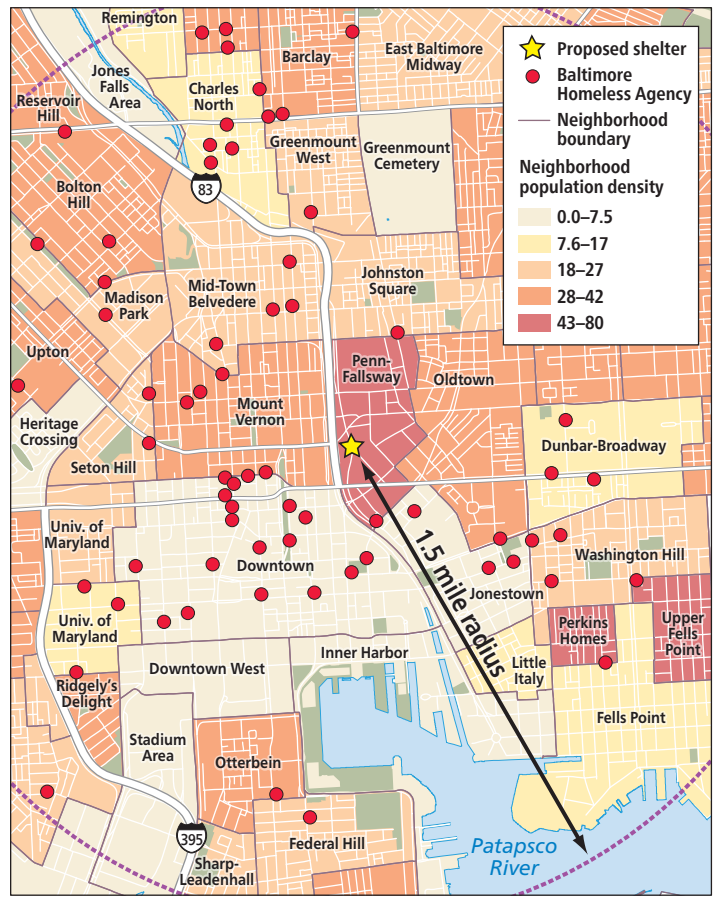
From data gathered by orbiting satellites or GPS devices to statistical data linked to spatial coordinates, these data provide a more detailed view of Earth's physical and human systems than has ever before been possible. To manage these data, geographers have developed a powerful tool—geographic information systems (GIS), which enable users to manipulate and display spatial data in map form. GIS maps contribute to problem solving in diverse fields such as science and engineering, industry, health care, retail sales, urban planning, environmental protection, law enforcement, and many others.



▲ **FIGURE AP-1** Within a GIS, environmental data attached to a common terrestrial reference system, such as latitude/longitude, can be stacked in layers for spatial comparison and analysis.

The power of GIS lies in its ability to map different data sets—called data layers—against each other, revealing relationships that might otherwise be difficult to detect. Figure AP-1 shows examples of environmental data organized as GIS data layers.

GIS can help answer almost any question involving spatial or locational analysis. In one application of GIS, the city of Baltimore, Maryland, wanted to determine the best location for an emergency shelter for homeless people. Among many other factors considered, one main criterion for the shelter was that it be accessible from other facilities providing services to the homeless. As shown in the map in Figure AP-2, the site selected was in a densely populated part of the city and at the center of a 1.5-mile-radius circle containing more than 60 percent of the city's providers of homeless services.



▲ **FIGURE AP-2** This GIS map shows that Baltimore's proposed homeless shelter would be near a cluster of service providers. The map's data layers include: neighborhood borders, population density (by neighborhood), and locations of homeless agencies.

Map Scale

Unaided, our human senses provide a limited view of our surroundings. To overcome those limitations, humankind has developed powerful vehicles of thought and communication, such as language, mathematics, and graphics. Each of those tools is based on elaborate rules; each has an information bias, and each may distort its message, often in subtle ways. Consequently, to use those aids effectively, we must understand their rules, biases, and distortions. The same is true for the special form of graphics we call maps: we must master the logic behind the mapping process before we can use maps effectively.

A fundamental issue in cartography, the science and art of making maps, is the vast difference between the size and geometry of what is being mapped—the real world, we will call it—and that of the map itself. Scale and projection are the basic cartographic concepts that help us understand that difference and its effects.

Our senses are dwarfed by the immensity of our planet; we can sense directly only our local surroundings. Thus, we cannot possibly look at our whole state or country at one time, even though we may be able to see the entire street where we live. Cartography helps us expand what we can see at one time by letting us view the scene from some distant vantage point. The greater the imaginary distance between that position and the object of our observation, the larger the area the map can cover, but the smaller the features will appear on the map. That reduction is defined by the *map scale*, the ratio of *map scale*, the ratio of the distance on the map to the distance on Earth. Map users need to know about map scale for two reasons: so that they can convert measurements on a map into meaningful realworld measures and so that they can know how abstract the cartographic representation is.

▲ **FIGURE AP-3** Common expressions of map scale.

Real-World Measures

A map can provide a useful substitute for the real world for many analytical purposes. With the scale of a map, for instance, we can compute the actual size of its features (length, area, and volume). Such calculations are helped by three expressions of a map scale: a written statement, a graphic scale, and a ratio (representative fraction or RF) (Figure AP-3).

A *written statement* of a map scale compares X units on the map to Y units on Earth, often abbreviated "X unit to Y units." For example, the expression "1 inch to 10 miles" means that 1 inch on the map represents 10 miles on Earth. Because the map is always smaller than the area that has been mapped, the ground unit is always the larger number. Both units are expressed in meaningful terms, such as inches or centimeters and miles or kilometers. Word statements are not intended for precise calculations but give the map user a rough idea of size and distance.

A *graphic scale*, such as a bar graph, is concrete and therefore overcomes the need to visualize inches and miles

that is associated with a word statement of scale. A graphic scale permits direct visual comparison of feature sizes and the distances between features. No ruler is required; any measuring aid will do. It needs only be compared with the scaled bar; if the length of 1 toothpick is equal to 2 miles on the ground and the map distance equals the length of 4 toothpicks, then the ground distance is 4 times 2, or 8 miles. Graphic scales are especially convenient in this age of touchscreens, when we are more likely to be working with a copy than with the original map. If a map is reduced or enlarged with fingers or a click, the graphic scale will change in proportion to the change in the size of the map and thus will remain accurate.

The third form of a map scale is the *ratio* or *representative fraction* (RF). An RF defines the ratio between the distance on the map and the distance on Earth in fractional terms, such as 1/633,600 (also written 1:633,600). The numerator of the fraction always refers to the distance on the map, and the denominator always refers to the distance on Earth. No units of measurement are given, but both numbers must be expressed in the same units. Because map distances are extremely small relative to the size of Earth, it makes sense to use small units, such as inches or centimeters. Thus the RF 1:633,600 might be read as "1 inch on the map to 633,600 inches on Earth."

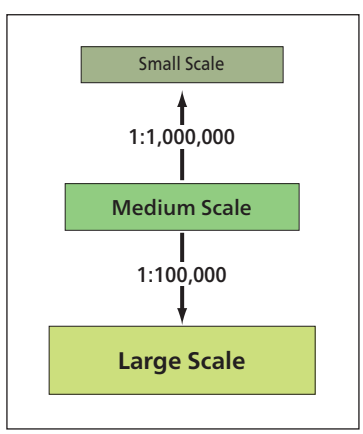
Herein lies a problem with the RF. Meaningful map–distance units imply a denominator so large that it is impossible to visualize. Thus, in practice, reading the map scale involves an additional step of converting the denominator to a meaningful ground measure, such as miles or kilometers. The unwieldy 633,600 becomes the more manageable 10 miles when divided by the number of inches in a mile (63,360).

On the plus side, the RF is good for calculations. In particular, the ground distance between points can be easily determined from a map with an RF. One simply multiplies the distance between the points on the map by the denominator of the RF. Thus a distance of 5 inches on a map with an RF of 1/126,720 would signify a ground distance of $5 \times 126{,}720$, which equals 633,600. Because all units are inches and there are 63,360 inches in a mile, the ground distance is 633,600/63,360, or 10 miles. Computation of area is equally straightforward with an RF. Computer manipulation and analysis of maps is based on the RF form of map scale.

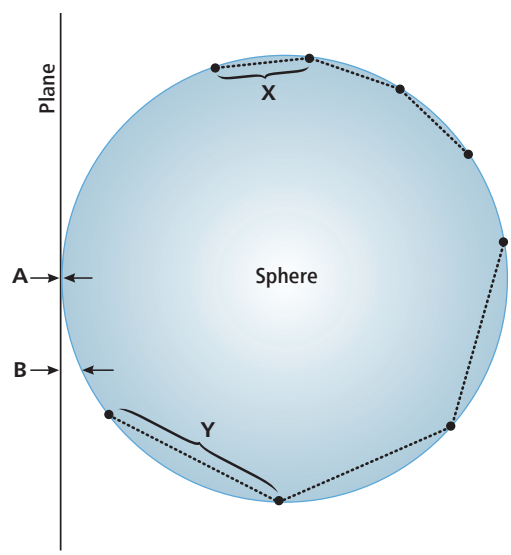
Guides to Generalization

Scales also help map users visualize the nature of the symbolic relation between the map and the real world. It is convenient here to think of maps as falling into three broad scale categories (Figure AP-4). (Do not be confused by the use of the words large AND small in this context; just remember that the larger the denominator, the smaller the scale ratio and the larger the area that is shown on the map.) Scale ratios greater than 1:100,000, such as the 1:24,000 scale of U.S. Geological Survey topographic quadrangles, are large-scale maps. Although those maps can cover only a local area, they can be drawn to rather rigid standards of accuracy. Thus they are useful for a wide range of applications that require detailed and accurate maps, including zoning, navigation, and construction.

At the other extreme are maps with scale ratios of less than 1:1,000,000, such as maps of the world that are found in atlases. Those are small-scale maps. Because they cover large areas, the symbols on them must be highly abstract. They are therefore best suited to general reference or planning, when detail is not important. Medium- or intermediate-scale maps have scales between 1:100,000 and 1:1,000,000. They are good for regional reference and planning purposes.



▲ **FIGURE AP-4** The scale gradient can be divided into three broad categories.



▲ **FIGURE AP-5** Relationships between surfaces on the round Earth and a flat map.

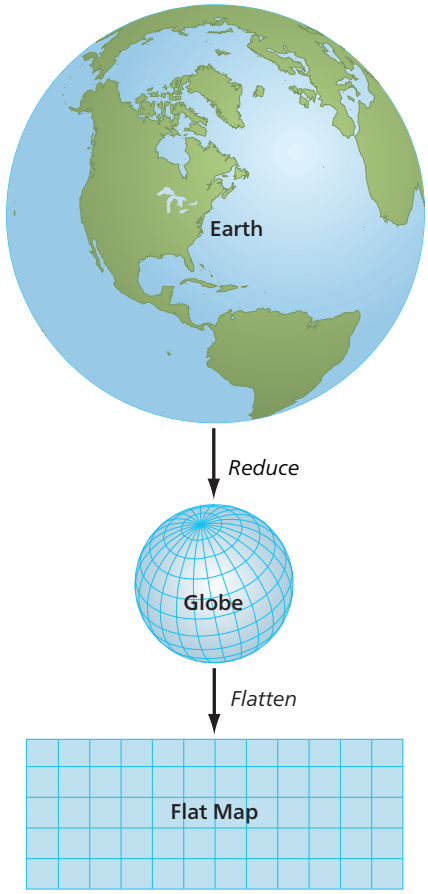
Another important aspect of map scale is to give us some notion of geometric accuracy; the greater the expanse of the real world shown on a map, the less accurate the geometry of that map is. Figure AP-5 shows why. If a curve is represented by straight line segments, short segments (X) are more similar to the curve than are long segments (Y). Similarly, if a plane is placed in contact with a sphere, the difference between the two surfaces is slight where they touch (A) but grows rapidly with increasing distance from the point of contact (B). In view of the large diameter and slight local curvature of Earth, distances will be well represented on large-scale maps (those with small denominators) but will be increasingly poorly represented at smaller scales. This close relationship between map scale and map geometry brings us to the topic of map projections.

Map Projections

The spherical surface of Earth is shown on flat maps by means of map projections. The process of "flattening" Earth is essentially a problem in geometry that has captured the attention of the best mathematical minds for centuries. Yet no one has ever found a perfect solution; there is no known way to avoid spatial distortion of one kind or another. Many map projections have been devised, but only a few have become standard.

Because a single flat map cannot preserve all aspects of Earth's surface geometry, a mapmaker must be careful to match the projection with the task at hand. To map something that involves distance, for example, a projection should be used in which distance is not distorted. In addition, a map user should be able to recognize which aspects of a map's geometry are accurate and which are distortions caused by a particular projection process. Fortunately, that objective is not too difficult to achieve.

It is helpful to think of the creation of a projection as a twostep process (Figure AP-6). First, the immense Earth is reduced to a small globe with a scale equal to that of the desired flat map. All spatial properties on the globe are true to those on Earth. Second, the globe is flattened. Since that cannot be done without distortion, it is accomplished in such a way that the resulting map exhibits certain desirable spatial properties.

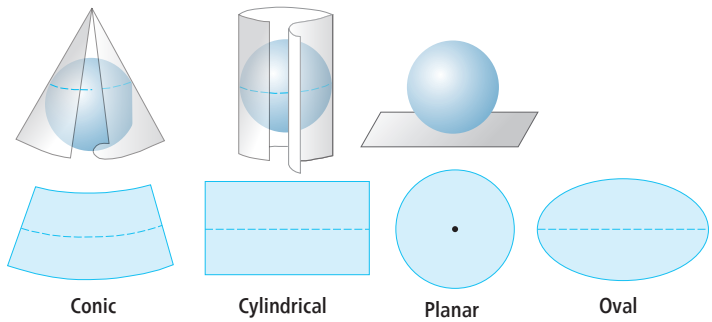


▲ **FIGURE AP-6** The two-step process of creating a projection.

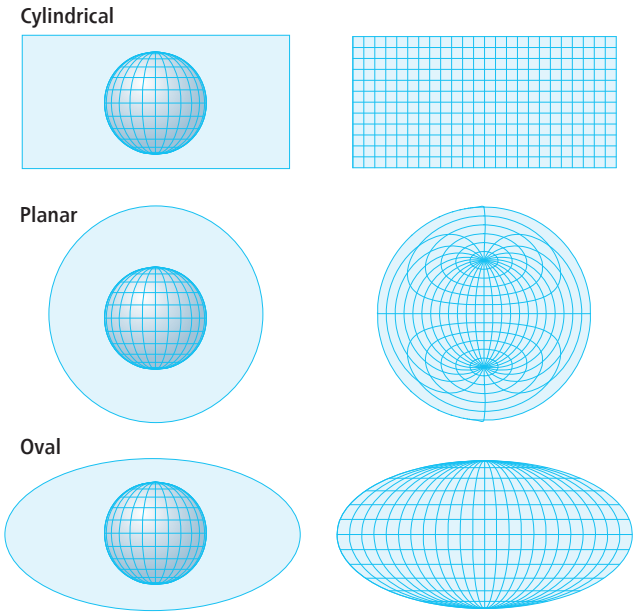
Perspective Models

Early map projections were sometimes created with the aid of perspective methods, but that has changed. In the modern electronic age, projections are normally developed by strictly mathematical means and are plotted out or displayed on computer–driven graphics devices. The concept of perspective is still useful in visualizing what map projections do, however. Thus projection methods are often illustrated by using strategically located light sources to cast shadows on a projection surface from a latitude/longitude net inscribed on a transparent globe.

The success of the perspective approach depends on finding a projection surface that is flat or that can be flattened without distortion. The cone, cylinder, and plane possess those attributes and serve as models for three general classes of map projections: *conic, cylindrical*, and *planar* (or azimuthal). Figure AP-7 shows those three classes, as well as a fourth, a false cylindrical class with an oval shape. Although the oval



▲ **FIGURE AP-7** General classes of map projections.



▲ **FIGURE AP-8** The visual properties of cylindrical and planar projections combined in oval projections.

class is not of perspective origin, it appears to combine properties of the cylindrical and planar classes (Figure AP-8).

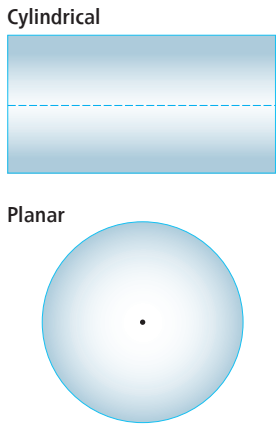
The relationship between the projection surface and the model at the point or line of contact is critical because distortion of spatial properties on the projection is symmetrical about, and increases with distance from, that point or line. That condition is illustrated for the cylindrical and planar classes of projections in Figure AP-9. If the point or line of contact is changed to some other position on the globe, the distortion pattern will be recentered on the new position but will retain the same symmetrical form. Thus centering a projection on the area of interest on Earth's surface can minimize the effects of projection distortion. And recognizing the general projection shape, associating it with a perspective model, and recalling the characteristic distortion pattern will provide the information necessary to compensate for projection distortion.

Preserved Properties

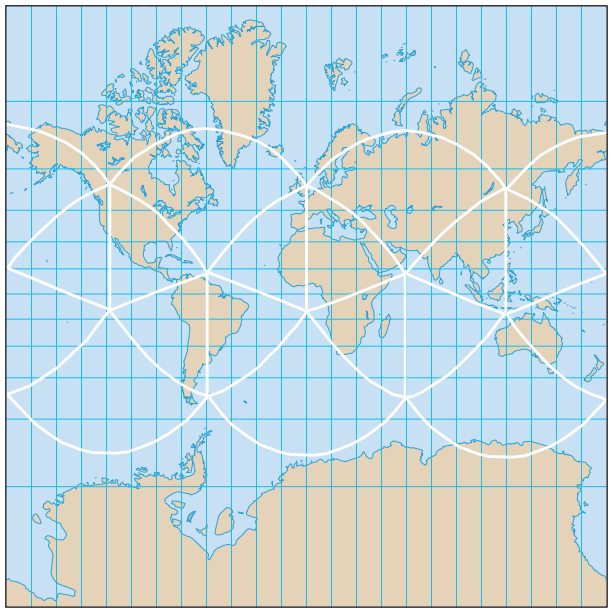
For a map projection to truthfully depict the geometry of Earth's surface, it would have to preserve the spatial attributes of *distance, direction, area, shape*, and *proximity*. That task can be readily accomplished on a globe, but it is not possible on a flat map. To preserve area, for example, a mapmaker must stretch or shear shapes; thus area and shape cannot be preserved on the same map. To depict both direction and distance from a point, area must be distorted. Similarly, to preserve area as well as direction from a point, distance has to be distorted. Because Earth's surface is continuous in all directions from every point, discontinuities that violate proximity relationships must occur on all map projections. The trick is to place those discontinuities where they will have the least impact on the spatial relationships in which the map user is interested.

We must be careful when we use spatial terms, because the properties they refer to can be confusing. The geometry of the familiar plane is very different from that of a sphere; yet when we refer to a flat map, we are in fact making reference to the spherical Earth that was mapped. A shape-preserving projection, for example, is truthful to local shapes – such as the right angle crossing of latitude and longitude lines – but does not preserve shapes at continental or global levels. A distance-preserving projection can preserve that property from one point on the map in all directions or from a number of points in several directions, but distance cannot be preserved in the general sense that area can be preserved. Direction can also be generally preserved from a single point or in several directions from a number of points but not from all points simultaneously. Thus a shape-, distance-, or direction-preserving projection is truthful to those properties only in part.

Partial truths are not the only consequence of transforming a sphere into a flat surface. Some projections exploit that transformation by expressing traits that are of considerable value for specific applications. One of those is the famous shape-preserving *Mercator projection* (Figure AP-10).



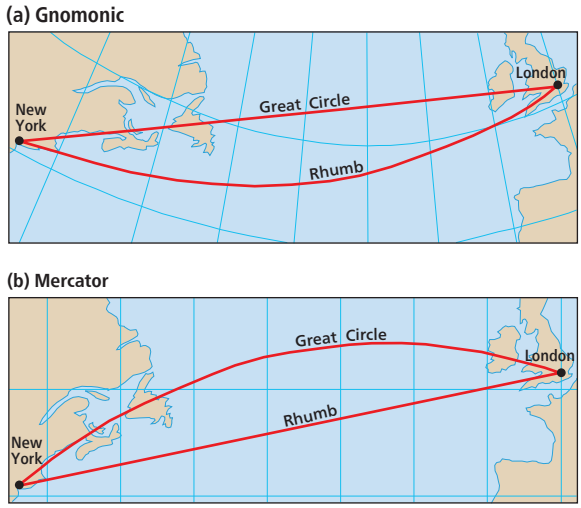
▶ **FIGURE AP-9** Characteristic patterns of distortion for two projection classes. Here, darker shading implies greater distortion.



▲ **FIGURE AP-10** The useful Mercator projection, showing extreme area distortion in the higher latitudes.

That cylindrical projection was derived mathematically in the 1500s so that a compass bearing (called rhumb lines) between any two points on Earth would plot as straight lines on the map. That trait let navigators plan, plot, and follow courses between origin and destination, but it was achieved at the expense of extreme areal distortion toward the margins of the projection (see Antarctica in Figure AP-10). Although the Mercator projection is admirably suited for its intended purpose, its widespread but inappropriate use for nonnavigational purposes has drawn a great deal of criticism.

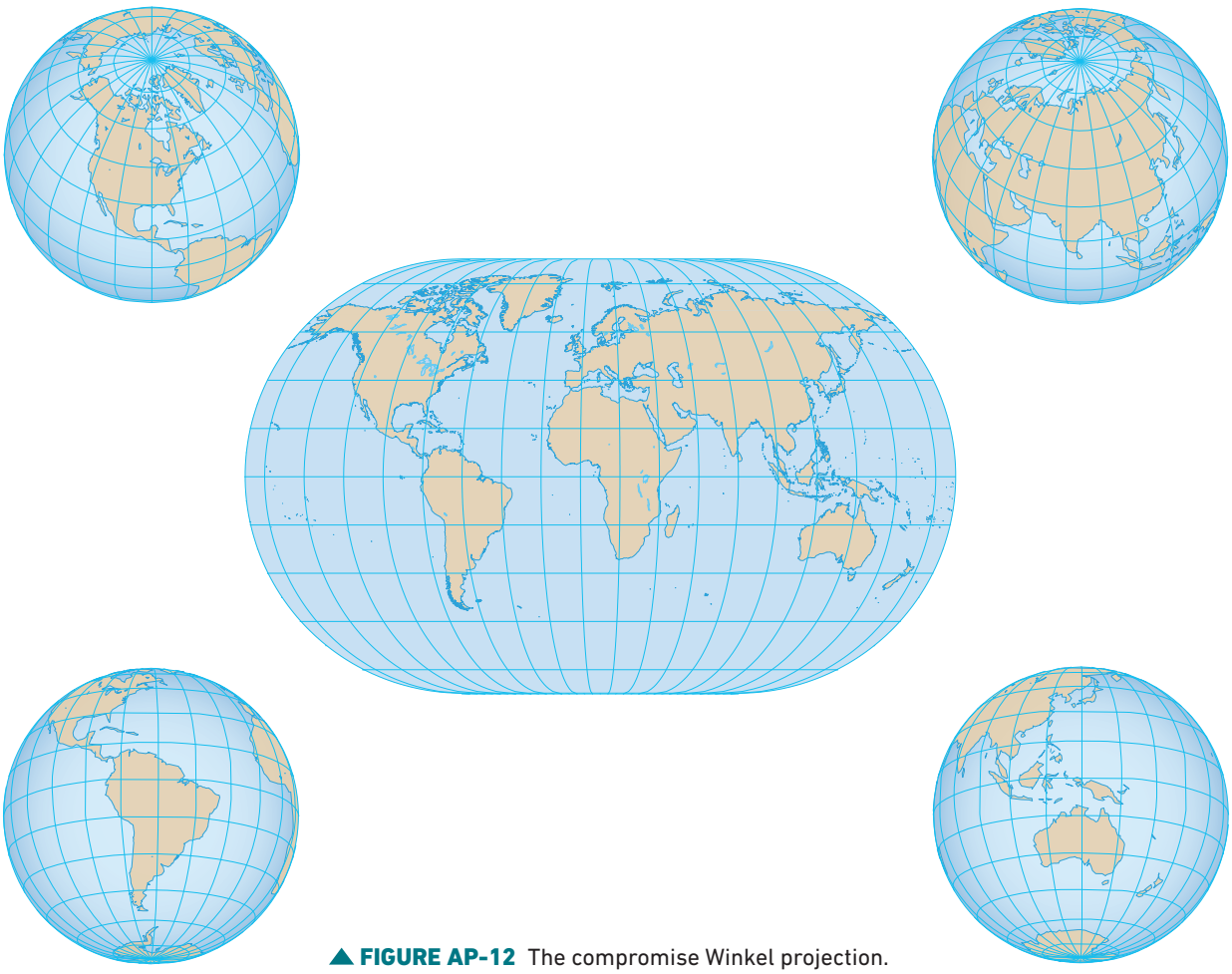
The *gnomonic projection* is also useful for navigation. It is a planar projection with the valuable characteristic of showing the shortest (or great circle) route between any two points on Earth as straight lines. Long-distance navigators first plot the great circle course between origin and destination on a gnomonic projection (Figure AP-11a). Next they transfer the straight line to a Mercator projection, where it normally appears as a curve (Figure AP-11b). Finally, using straight-line segments, they construct an approximation of that course on the Mercator projection. Navigating the shortest course between origin and destination then involves following the straight segments of the course and making directional corrections between segments. Like the Mercator projection, the specialized gnomonic projection distorts other spatial properties so severely that it should not be used for any purpose other than navigation or communications.



▲ **FIGURE AP-11** **(a)** A gnomonic projection and **(b)** a Mercator projection, both of value to long-distance navigators.

Projections Used in Textbooks

Although a map projection cannot be free of distortion, it can represent one or several spatial properties of Earth's surface accurately if other properties are sacrificed. The *Winkel projection*, which is used for most of the world maps throughout this textbook, illustrates that point well (Figure AP-12). It is an example of a compromise projection.

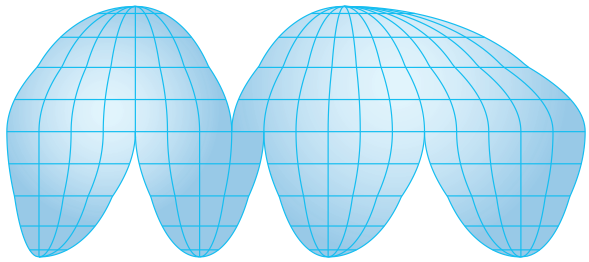


▲ **FIGURE AP-12** The compromise Winkel projection.

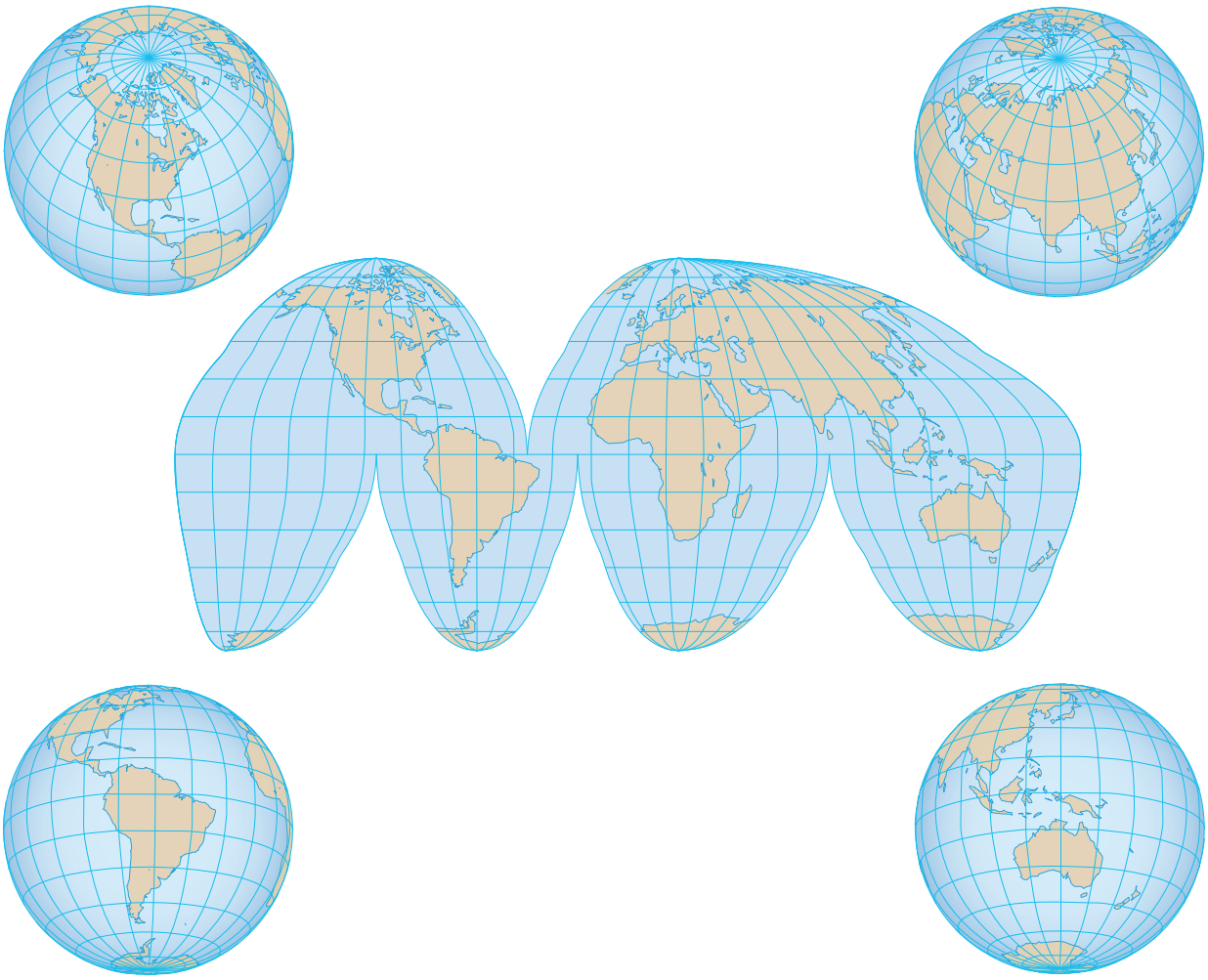
No special property is achieved at the expense of others, and distortion is rather evenly distributed among the various properties, instead of being focused on one or several properties.

Its oval projection has a global feel. But the Winkel projection shows the polar regions as lines that are slightly more than half the length of the equator, thus exaggerating distances and areas near the poles. Areas look larger than they really are in the high latitudes (near the poles) and smaller than they really are in the low latitudes (near the equator). In addition, not all latitude and longitude lines intersect at right angles, as they do on Earth so we know that the Winkel projection does not preserve direction or shape either. Overall, the Winkel projection does a good job of representing spatial relationships, especially in the low to middle latitudes and along the central meridian.

Goode's homolosine projection, shown in Figure AP-13, belongs to the oval category and shows area accurately, although it gives the impression that Earth's surface has been torn, peeled, and flattened. The interruptions in Figure AP-13 have been placed in the major oceans, giving continuity to the land masses. Ocean areas could be featured instead by placing the interruptions in the continents. Obviously, that type of interrupted projection severely distorts proximity relationships. Consequently, in different locations the properties of distance, direction, and shape are also distorted to varying degrees. The distortion pattern mimics that of cylindrical projections, with the equatorial zone the most faithfully represented (Figure AP-14). However, it has more interruptions than Winkel projection does, so it preserves proximity less accurately.



▲ **FIGURE AP-14** The distortion pattern of the interrupted Goode's homolosine projection, which mimics that of cylindrical projections.



▲ **FIGURE AP-13** An interrupted Goode's homolosine, an equal-area projection.

GLOSSARY

A

Abiotic Composed of nonliving or inorganic matter.

Absolute location Description of the position of a place in a way that never changes, such as geographic coordinates of latitude and longitude.

Acculturation The process of changes in culture that result from the meeting of two groups, each of which retains distinct cultural features.

Acid deposition The accumulation of acids on Earth's surface.

Acid precipitation Conversion of sulfur oxides and nitrogen oxides to acids that return to Earth as rain, snow, or fog.

Active solar energy system A solar energy system that collects energy through the use of mechanical devices such as photovoltaic cells or flat-plate collectors.

Adolescent fertility rate The number of births per 1,000 women ages 15 to 19.

African American Vernacular English (AAVE) A dialect used by some Black Americans.

Agnosticism The belief that the existence of God cannot be proven or disproven empirically.

Agribusiness Commercial agriculture characterized by the integration of different steps in the food-processing industry.

Agricultural density The ratio of the number of farmers to the total amount of arable land.

Agriculture The deliberate effort to modify a portion of Earth's surface through the cultivation of crops and the raising of livestock.

Air defense identification zone Air space across which a country unilaterally declares its right to identify, locate, and control civil aircraft in the interest of national security.

Air pollution Concentration of trace substances, such as carbon monoxide, sulfur dioxide, nitrogen oxides, hydrocarbons, and solid particulates, at a greater level than occurs in average air.

Alternative fact (or **alt fact)** A statement that can be proved to be false.

Animate power Power supplied by animals or by people.

Animism The belief that objects, such as plants and stones, or natural events, like thunderstorms and earthquakes, have a discrete spirit and conscious life.

Annexation Legally adding land area to a city in the United States.

Anocracy A country that is not fully democratic or fully autocratic but rather displays a mix of the two types.

Antecedent boundary A physical feature that serves as a boundary, so named because it existed before the present settlement.

Antinatalist policy Government policy that supports lower birth rates.

Apartheid Laws (no longer in effect) in South Africa that physically separated different races into different geographic areas.

Apparel An article of clothing.

Aquaculture (or **aquafarming)** The cultivation of seafood under controlled conditions.

Arable land Land suited for agriculture.

Arithmetic density The total number of people divided by the total land area.

Assimilation The process by which a group's cultural features are altered to resemble those of another group.

Asylum seeker Someone who has migrated to another country in the hope of being recognized as a refugee.

Atheism The belief that God does not exist.

Atmosphere The thin layer of gases surrounding Earth.

Autocracy A country that is run according to the interests of the ruler rather than the people.

Autonomous religion A religion that does not have a central authority but shares ideas and cooperates informally.

B

Balance of power A condition of roughly equal strength between opposing countries or alliances of countries.

Basic business A business that sells its products or services primarily to consumers outside the settlement.

Behavioral geography An approach to human geography that emphasizes the importance of understanding the psychological basis for individual human actions in space.

Bid-rent curve A model showing that the amount a farmer is willing to pay for land declines with increasing distance from the market.

Biochemical oxygen demand (BOD) The amount of oxygen required by aquatic bacteria to decompose a given load of organic waste; a measure of water pollution.

Biological diversity (or **biodiversity)** The number of species within a specific habitat.

Biomass fuel Fuel derived from wood, plant material, or animal waste.

Biosphere All living organisms on Earth, including plants and animals, as well as microorganisms.

Biotic Composed of living organisms.

Black Lives Matter (BLM) Movement that campaigns against violence and perceived racism toward Black people and educates others about the challenges that Black Americans continue to face in the United States.

Blockbusting A process by which real estate agents convince white property owners to sell their houses at low prices because of fear that Black people will soon move into the neighborhood.

Boundary An invisible line that marks the extent of a state's territory.

Brain drain Large-scale emigration by talented people.

Branch (of a religion) A large and fundamental division within a religion.

Break-of-bulk point A location where transfer is possible from one mode of transportation to another.

Bulk-gaining industry An industry in which the final product weighs more or comprises a greater volume than the inputs.

Bulk-reducing industry An industry in which the final product weighs less or comprises a lower volume than the inputs.

Business service A service that primarily meets the needs of other businesses, including professional, financial, and transportation services.

C

Carbon capture and storage (CCS) The process of capturing waste carbon dioxide, transporting it to a storage site, and depositing it where it will not enter the atmosphere (normally underground).

Carrying capacity The maximum population size of a species that the environment can sustain indefinitely, given the available resources.

Cartogram A map in which the size of an area is proportional to the value of the variable.

Cartography The science of making maps.

Cash crop A crop that is grown for sale rather than for the farmer's own use.

Caste The class or distinct hereditary order into which a Hindu is assigned, according to religious law.

Census A complete enumeration of a population.

Census tract An area delineated by the U.S. Bureau of the Census for which statistics are published; in urban areas, census tracts correspond roughly to neighborhoods.

Central business district (CBD) The area of a city where business, consumer, and public services are clustered.

Central city (see **municipality**).

Central place A market center for the exchange of services by people attracted from the surrounding area.

Central place theory A theory that explains the distribution of services based on the fact that settlements serve as centers of market areas for services; larger settlements are fewer and farther apart than smaller settlements and provide services for a larger number of people who are willing to travel farther.

Centrifugal force A cultural value that tends to pull people apart.

Centripetal force A cultural value that tends to unify people.

Cereal grain A grass that yields grain for food.

Chlorofluorocarbon (CFC) A gas used as a solvent, a propellant in aerosols, and a refrigerant.

Choropleth map A map in which areas are shaded or patterned in proportion to the measurement of the variable.

Circular migration The temporary movement of a migrant worker between home and host countries to seek employment.

Circulation Short-term, repetitive, or cyclical movements that recur on a regular basis.

Citizen science Scientific research by amateur scientists.

City-state A sovereign state comprising a city and its immediately surrounding countryside.

Climate The long-term average weather condition at a particular location.

Clustered rural settlement A rural settlement in which the houses and farm buildings of each family are situated close to each other, with fields surrounding the settlement.

Colonialism An attempt by one country to establish settlements and to impose its political, economic, and cultural principles in another territory.

Colony A territory that is legally tied to a sovereign state rather than completely independent.

Columbian Exchange The transfer of plants and animals, as well as people, culture, and technology, between the Western Hemisphere and Europe, as a result of European colonialization and trade.

Combined statistical area (CSA) In the United States, two or more contiguous core-based statistical areas tied together by commuting patterns.

Commercial agriculture Agriculture undertaken primarily to generate products for sale off the farm.

Commercial gardening Agriculture focusing on the production of fruits, vegetables, and other horticulture.

Compact district A local government district in which the residents live as near to one another as possible and the distance from the center to any boundary varies as little as possible.

Compact state A state in which the distance from the center to any boundary does not vary significantly.

Concentration The extent of a feature's spread over a given area.

Concentric zone model A model of the internal structure of cities in which social groups are spatially arranged in a series of rings.

Congregation A local assembly of persons brought together for common religious worship.

Connection The relationships among people and objects across the barrier of space.

Consequent boundary A boundary drawn in order to separate groups based on ethnic, linguistic, religious, or economic differences.

Conservation The sustainable management of a natural resource to meet human needs.

Conservation tillage A method of soil cultivation that reduces soil erosion and runoff.

Consumer service A business that provides services primarily to individual consumers, including retail services and education, health, and leisure services.

Consumptive water usage The use of water that causes it to evaporate rather than return to nature as a liquid.

Contagious diffusion The rapid, widespread diffusion of a feature or trend throughout a population.

Cooperative An association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned enterprise.

Coordinated Universal Time (UTC) Informally Greenwich Mean Time (GMT). The time in the zone encompassing the prime meridian, or 0° longitude.

Core-based statistical area (CBSA) In the United States, the collection of all metropolitan statistical areas and micropolitan statistical areas.

Cosmogony A set of beliefs concerning the origin of the universe.

Cottage industry Manufacturing based in homes rather than in factories, most common prior to the Industrial Revolution.

Counterurbanization Net migration from urban to rural areas in developed countries.

Creole (or **creolized) language** A language that results from the mixing of a colonizer's language with the indigenous language of the people being dominated.

Crop A plant cultivated by people.

Crop rotation The practice of rotating use of different fields from crop to crop each year to avoid exhausting the soil.

Crude birth rate (CBR) The total number of live births in a year for every 1,000 people alive in the society.

Crude death rate (CDR) The total number of deaths in a year for every 1,000 people alive in the society.

Cultural boundary A boundary that follows the distribution of cultural features, such as ethnicity, religion, and language.

Cultural ecology A geographic approach that emphasizes human-environment relationships.

Cultural homogenization The process of reduction in cultural diversity through the diffusion of popular culture.

Cultural landscape An approach to geography that emphasizes the relationships among social and physical phenomena in a particular study area.

Culture The body of material possessions, customary beliefs, and social norms that together constitutes the distinct tradition of a group of people.

Custom The frequent repetition of an act, to the extent that it becomes characteristic of the group of people performing the act.

Cyber espionage The unauthorized and clandestine deployment of a computer virus to observe or destroy data in the computer systems of government agencies and large corporations.

D

Dairy farm A form of commercial agriculture that specializes in the production of milk and other dairy products.

Demand The quantity of something that consumers are willing and able to buy.

Democracy A country in which citizens elect leaders and can run for office.

Demographic transition The process of change in a society's population from a condition of high crude birth and death rates and low rate of natural increase to a condition of low crude birth and death rates, low rate of natural increase, and higher total population.

Demography The scientific study of population characteristics.

Denglish A combination of Deutsch (the German word for German) and English.

Denomination (of a religion) A division of a branch that unites a number of local congregations into a single legal and administrative body.

Density The frequency with which something exists within a given unit of area.

Density gradient The change in density in an urban area from the center to the periphery.

Dependency ratio The number of people under age 15 and age 65 and over compared to the number of people active in the labor force.

Desertification (also known as semiarid land degradation) Degradation of land, especially in semiarid areas, primarily because of human actions such as excessive crop planting, animal–grazing, and tree cutting.

Developed country A country that has progressed relatively far along a continuum of development.

Developing country A country that is at a relatively early stage in the process of development.

Development A process of improvement in the conditions of people through diffusion of knowledge and technology.

Dialect A regional variety of a language distinguished by vocabulary, spelling, and pronunciation.

Dietary energy consumption The amount of food that an individual consumes, measured in kilocalories (Calories in the United States).

Diffusion The process by which a feature spreads from one place to another over time.

Dispersed rural settlement A rural settlement pattern characterized by isolated farms rather than clustered villages.

Distance decay The diminished importance and eventual disappearance of a phenomenon with increasing distance from its origin.

Distribution The arrangement of something across Earth's surface.

Dot distribution map A map that depicts data that consists of discrete observations. Each dot represents a predetermined number of observations, which could be one or many.

Double cropping Harvesting twice a year from the same field.

Doubling time The number of years needed to double a population, assuming a constant rate of natural increase.

E

Ecology The scientific study of ecosystems.

Economic base A community's collection of basic businesses.

Ecosystem A group of living organisms and the abiotic spheres with which they interact.

Ecotourism Responsible travel to natural areas that conserves the environment, sustains the well-being of local people, and involves interpretation and education.

Ecumene The portion of Earth's surface occupied by permanent human settlement.

Edge city Node of office and retail activities on the edge of an urban area.

Elongated state A state with a long, narrow shape.

Emigration Permanent movement of people from a location.

Enclosure movement The process of consolidating small landholdings into a smaller number of larger farms in England during the eighteenth century.

Endangered language A language that is threatened or dying because it is losing users and may not be retained by the younger generation.

Environmental determinism A nineteenth- and early twentieth-century approach to the study of geography that argued that the general laws sought by human geographers could be found in the physical sciences. Geography was therefore the study of how the physical environment caused human activities.

Epidemic A widespread occurrence of an infectious disease in a community at a particular time.

Epidemiologic transition The process of change based on the distinctive causes of death in a population at each stage of the demographic transition.

Epidemiology The branch of medical science concerned with the incidence, distribution, and control of diseases that are prevalent among a population at a specific time and are produced by some unique causes not generally present in the affected locality.

Esports Sports competitions using video games.

Ethnic cleansing A purposeful policy designed by one ethnic or religious group to remove by violent and terror-inspiring means the civilian population of another ethnic or religious group from certain geographic areas.

Ethnic religion A religion with a relatively concentrated spatial distribution whose principles are likely to be based on the physical characteristics of the particular location in which its adherents are concentrated.

Ethnicity Identity with a group of people who share the cultural traditions of a particular homeland or hearth.

Ethnophobia Fear of people of a particular ethnicity.

Expansion diffusion The spread of a feature or trend among people from one area to another in an additive process.

Extinct language A language that was once used by people in daily activities but is no longer used.

F

Fair trade A variation of international trade that provides greater equity to workers, small businesses, and consumers, focusing primarily on products exported from developing countries to developed countries.

Fake news A false report disseminated under the guise of an authentic news report, created to maliciously spread misinformation and mislead consumers of the content.

Family-based migration Migration of people to a specific location because relatives previously migrated there.

Federal state An internal organization of a state that allocates most powers to units of local government.

Female labor force participation rate The percentage of women holding full-time jobs outside the home.

First agricultural revolution The process that began when human beings first domesticated plants and animals and no longer relied entirely on hunting and gathering.

Fishing The capture of wild fish and other seafood living in the waters.

Floodplain The area subject to flooding during a given number of years, according to historical trends.

Folk culture Culture traditionally practiced by a small, homogeneous, rural group living in relative isolation from other groups.

Food security Physical, social, and economic access at all times to safe and nutritious food sufficient to meet dietary needs and food preferences for an active and healthy life.

Forced migration Permanent movement of people compelled by political or environmental factors.

Fordist production A form of mass production in which each worker is assigned one specific task to perform repeatedly.

Foreign direct investment (FDI) Investment made by a foreign company in the economy of another country.

Formal region (or **uniform region)** An area in which everyone shares in at least one distinctive characteristic.

Fossil fuel An energy source formed from the residue of plants and animals buried millions of years ago.

Fragmented state A state that includes several discontinuous pieces of territory.

Franchise An agreement between a corporation and a business owner to market that corporation's products in a local area.

Franglais A combination of *français* and *anglais* (the French words for French and English, respectively).

Frontier A zone separating two states in which neither state exercises political control.

Functional region (or **nodal region)** An area organized around a node or focal point.

Fundamentalism Literal interpretation and strict adherence to basic principles of a religion (or a religious branch, denomination, or congregation).

G

Galactic (or **peripheral) model** A model of North American urban areas consisting of an inner city surrounded by large suburban residential and business areas tied together by a beltway or ring road.

Gender Development Index (GDI) An indicator constructed by the U.N. to measure the gender gap in the level of achievement in terms of income, education, and life expectancy.

Gender Inequality Index (GII) An indicator constructed by the U.N. to measure the extent of each country's gender inequality in terms of reproductive health, empowerment, and the labor market.

Gender Social Norms Index (GSNI) An indicator constructed by the U.N. to measure the strength of attitudes biased against women.

Genetically modified organism (GMO) A living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology.

Genocide The mass killing of a group of people in an attempt to eliminate the entire group from existence.

Gentrification A process of converting an urban neighborhood from a predominantly low-income, renter-occupied area to a predominantly middle-income, owner-occupied area.

Geographic information science (GIScience) Analysis of data about Earth acquired through satellite and other electronic information technologies.

Geographic information system (GIS) A computer system that captures, stores, queries, and displays geographic data.

Geometric boundary A boundary based on a human construct such a as a straight line or a parallel of latitude.

Geotagging Identification and storage of a piece of information by its precise latitude and longitude coordinates.

Geothermal energy Energy from steam or hot water produced from hot or molten underground rocks.

Gerrymandering The process of redrawing legislative boundaries for the purpose of benefiting the party in power.

Ghetto During the Middle Ages, a neighborhood in a city set up by law to be inhabited only by Jews; now used to denote a section of a city in which members of a group live because of social, legal, or economic discrimination.

Global city A major center for the provision of services in the global economy.

Global Positioning System (GPS) A system that determines the precise position of something on Earth through a series of satellites, tracking stations, and receivers.

Globalization Actions or processes that involve the entire world and result in making something worldwide in scope.

Graduated symbol map A map that displays symbols that change in size according to the value of the variable.

Grain Seed of a cereal grass.

Gravity model A model that holds that the potential use of a service at a particular location is directly related to the number of people in a location and inversely related to the distance people must travel to reach the service.

Green revolution (see **third agricultural revolution**).

Greenhouse effect The anticipated increase in global temperature caused by carbon dioxide (emitted by burning fossil fuels) trapping some of the radiation emitted by Earth's surface in the atmosphere.

Gross domestic product (GDP) The value of the total output of goods and services produced in a country in a year, excluding money that leaves and enters the country.

Gross national income (GNI) The value of the output of goods and services produced in a country in a year, including money that leaves and enters the country.

Gross national product (GNP) The value of the output of goods and services produced by the residents and businesses of a country in a year regardless of whether they are located in the country or abroad.

Guest worker A term once used for a worker in search of a higher-paying job who migrated to the developed countries of Northern and Western Europe, usually from Southern and Eastern Europe or from North Africa.

H

Habit A repetitive act performed by a particular individual.

Hearth A place from which an innovation originates.

Herbicide A chemical used to control unwanted plants.

Hierarchical diffusion The spread of a feature or trend from one key person or node of authority or power to other persons or places.

Hierarchical religion A religion in which a central authority exercises a high degree of control.

Horticulture Growing of fruits, vegetables, flowers, and tree crops.

Human Development Index (HDI) An indicator constructed by the U.N. to measure the level of development for a country through a combination of income, education, and life expectancy.

Humanistic geography An approach to human geography that emphasizes the different ways that individuals form ideas about place and give those places symbolic meanings.

Hydraulic fracturing (or **fracking)** Pumping water at high pressure into the ground to break apart rocks and thereby release natural gas.

Hydroelectric power Power generated from moving water.

Hydrosphere All of the water on and near Earth's surface.

I

Immigration Permanent movement of people to a new location.

Incorporated place (see **municipality**).

Industrial Revolution A series of improvements in machine-driven technology that transformed the process of manufacturing goods.

Industry The manufacturing of goods in a factory.

Inequality-adjusted Human Development Index (IHDI) A modification of the HDI to account for inequality.

Infant mortality rate (IMR) The total number of deaths in a year among infants under 1 year of age for every 1,000 live births in a society.

Informal settlement An area within a city in a developing country where housing has been built on land to which the occupants have no legal claim or has not been built to the city's standards for legal buildings.

Institutional language A language used in education, work, mass media, and government.

Intensive subsistence agriculture A form of subsistence agriculture in Asia's major population concentrations in which farmers expend a large amount of effort to produce the maximum feasible yield from a parcel of land.

Internal migration Permanent movement of people within a particular country.

Internally displaced person (IDP) Someone who has been forced to migrate for similar political reasons as a refugee but who has not migrated across an international border.

International Date Line An arc that for the most part follows 180° longitude. When the International Date Line is crossed heading east (toward America), the clock moves back 24 hours, or one entire day. When it is crossed heading west (toward Asia), the calendar moves ahead one day.

International migration Permanent movement of people from one country to another.

Interregional migration Permanent movement of people from one region of a country to another.

Intervening obstacle An environmental or cultural feature of the landscape that hinders migration.

Intraregional migration Permanent relocation of people within one region of a country.

Isogloss A boundary that separates regions in which different language usages predominate.

Isolated language A language that is unrelated to any other languages and therefore not attached to any language family.

Isoline map A map that connects places of a particular value by lines.

J

Just-in-time delivery Shipment of parts and materials to arrive at a factory moments before they are needed.

L

Labor-intensive industry An industry for which labor costs comprise a high percentage of total expenses.

Landlocked state A state that does not have a direct outlet to the sea.

Language A system of communication through speech, movement, sounds, or symbols that a group of people understands to have the same meaning.

Language branch A collection of languages related through a common ancestor that can be confirmed through archaeological evidence.

Language family A collection of languages related to each other through a common ancestor long before recorded history.

Language group A collection of languages within a branch that share a common origin in the relatively recent past and display relatively few differences in grammar and vocabulary.

Latitude The numbering system used to indicate the location of parallels drawn on a globe and measuring distance north and south of the equator (0°).

Life expectancy The average number of years an individual can be expected to live, given current social, economic, and medical conditions. Life expectancy at birth is the average number of years a newborn infant can expect to live.

Lingua franca A language mutually understood and commonly used in trade by people who have different native languages.

Linguist A specialist in the study of human language.

Literacy rate The percentage of a country's people who can read and write.

Literary tradition A language that is written as well as spoken.

Lithosphere Earth's crust and a portion of upper mantle directly below the crust.

Location The position of anything on Earth's surface.

Logogram A symbol that represents a word rather than a sound.

Longitude The numbering system used to indicate the location of meridians drawn on a globe and measuring distance east and west of the prime meridian (0°).

Lunar calendar A calendar with months that correspond to cycles of moon phases.

Lunisolar calendar A calendar with lunar months that are brought into alignment with the solar year through some process.

M

Malware (or **malicious software)** Hostile or intrusive computer software designed to cause intentional harm.

Map A two-dimensional, or flat, representation of Earth's surface or a portion of it.

Map scale The relationship between the size of an object on a map and the size of the actual feature on Earth's surface.

Maquiladora A factory built by a U.S. company in Mexico near the U.S. border to take advantage of the much lower labor costs in Mexico.

Market area (or **hinterland)** The area surrounding a central place from which people are attracted to use the place's goods and services.

Mashup A map that overlays data from one source on top of a map provided by a mapping service.

Maternal mortality rate The annual number of female deaths per 100,000 live births from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes).

Media market area An area where the population receives the same TV and radio station broadcasts and newspapers and consumes similar internet content.

Medical revolution Health diagnostic and disease treatment technology invented in Europe and North America that has diffused to the developing countries in Latin America, Asia, and Africa. Improved medical practices have eliminated many of the traditional causes of death in developing countries and enabled more people to live longer and healthier lives.

Megacity An urban settlement with a total population in excess of 10 million people.

Megalopolis A continuous urban complex, such as in the northeastern United States.

Meme Contagious diffusion through the internet or social media.

Mental map A representation of a portion of Earth's surface based on what an individual knows about a place that contains personal impressions of what is in the place and where the place is located.

Meridian An arc drawn on a map between the North and South poles.

Metacity An urban settlement with a total population in excess of 20 million people.

Metropolitan statistical area (MSA) In the United States, an urbanized area of at least 50,000 population, the county within which the city is located, and adjacent counties meeting one of several tests indicating a functional connection to the central city.

Microfinance Provision of small loans and financial services to individuals and small businesses in developing countries.

Micropolitan statistical area (μSA) An urbanized area of between 10,000 and 50,000 inhabitants, the county in which it is located, and adjacent counties tied to the city.

Microstate A state that encompasses a very small land area.

Migration A form of relocation diffusion involving permanent relocation of people to a new location.

Migration transition A change in the pattern of movement of people in a society that results from industrialization, population growth, and other social and economic changes that also produces the demographic transition.

Milkshed The area surrounding a city from which milk is supplied.

Millennium Development Goals Eight goals adopted by the U.N. in 2002 to reduce disparities between developed and developing countries by 2015.

Missionary An individual who helps to diffuse a universalizing religion.

Mixed crop and livestock farming Commercial farming characterized by integration of crops and livestock; most of the crops are fed to animals rather than consumed directly by humans.

Mobility All types of movements of people between locations.

Monocropping The practice of growing the same, single crop year after year.

Monotheism The doctrine of or belief in the existence of only one God.

Multidimensional Poverty Index (MPI) An index constructed by the U.N. that modifies the HDI to measure the complexities of the lives of people living in poverty.

Multinational state A state that contains two or more cultural groups with traditions of self-determination that agree to coexist peacefully.

Multiple nuclei model A model of the internal structure of cities in which social groups are arranged around a collection of nodes of activities.

Municipality (or **incorporated place** or **central city)** An urban settlement that has been legally incorporated into an independent, self-governing unit.

Mutual intelligibility The ability of people communicating in two ways to readily understand each other without prior familiarity or special effort.

N

Nation A large group of people who are united by common cultural characteristics, such as language and ethnicity, or by shared history.

Nation-state A state whose territory corresponds to that occupied by a particular nation.

Nationalism Loyalty and devotion to a particular nationality.

Nationality Identity with a group of people who share legal attachment to a particular country.

Natural increase rate (NIR) The percentage growth of a population in a year, computed as the crude birth rate minus the crude death rate.

Net migration The difference in a given place between the level of immigration and the level of emigration.

Network A chain of communication that connects places.

New international division of labor Transfer of some types of jobs, especially those requiring low-paid, less-skilled workers, from developed countries to developing countries.

No tillage A farming practice that leaves the soil undisturbed and the entire residue of the previous year's harvest left untouched on the fields.

Nonbasic business A business that sells its products primarily to consumers in the community where the business is located.

Nonconsumptive water usage The use of water that is returned to nature as a liquid.

Nonpoint source pollution Pollution that originates from a large, diffuse area.

Nonrenewable resource Something produced in nature more slowly than it is consumed by humans.
Nuclear fission The splitting of an atomic nucleus to release energy.
Nuclear fusion Creation of energy by joining the nuclei of two hydrogen atoms to form helium.

O

Official language The language adopted for use by a government for the conduct of business and publication of documents.
Organic agriculture Farming that depends on the use of naturally occurring substances while prohibiting or strictly limiting synthetic substances, such as herbicides, pesticides, and growth hormones.
Outsourcing A decision by a corporation to turn over much of the responsibility for production to independent suppliers.
Overfishing Capturing fish faster than they can reproduce.
Overpopulation A situation in which the number of people in an area exceeds the capacity of the environment to support life at a decent standard of living.
Overtourism A phenomenon whereby certain places of interest are visited by excessive numbers of tourists, causing undesirable effects for the places visited.
Ozone A gas that absorbs ultraviolet solar radiation in the stratosphere, a zone between 10 and 50 kilometers (6 and 30 miles) above Earth's surface.

P

Paddy The Malay word for "wet rice"; increasingly used to describe a flooded field.
Pandemic An epidemic that occurs over a wide geographic area and affects a very high proportion of the population at the same time.
Parallel A circle drawn around the globe parallel to the equator and at right angles to the meridians.
Participatory GIS (PGIS) Community-based mapping, representing local knowledge and information.
Passive solar energy systems Solar energy systems that collect energy without the use of mechanical devices.
Pastoral nomadism A form of subsistence agriculture based on herding domesticated animals.
Pattern The geometric or regular arrangement of something in a particular area.
Perforated state A state that completely surrounds another one.
Periodic market A collection of individual vendors who come together to offer goods and services in a location on specified days.
Pesticide A substance to control pests, including weeds.
Photochemical smog An atmospheric condition formed through a combination of weather conditions and pollution, especially from motor vehicle emissions.
Photogrammetry The science of taking measurements of Earth's surface from photographs.
Photovoltaic cell A solar energy cell, usually made from silicon, that collects solar rays to generate electricity.
Physical boundary A boundary that follows a significant feature of the natural landscape, such as a mountain range and river.
Physiological density The number of people per unit area of arable land.
Pidgin language A form of language that adopts a simplified grammar and limited vocabulary of a lingua franca; used for communications among speakers of two different languages.
Pilgrimage A journey to a place considered sacred for religious purposes.
Place A specific point on Earth, distinguished by a particular characteristic.
Planetary pressures-adjusted Human Development Index (PHDI) An indicator constructed by the U.N. that modifies the HDI to account for a country's carbon dioxide emissions per person and the amount of raw materials extracted per person to meet the country's demand for goods and services.
Plantation A large farm in a developing country that specializes in the production of one or two crops for sale.
Point source pollution Pollution that enters a body of water from a specific source.
Polder Land that is created by draining water from an area.
Political ecology An approach to sustainability that focuses on how politics and economic power shape the ability to manage resources.
Pollution Concentration of waste added to air, water, or land at a greater level than can be dispersed by air, diluted by water, or decomposed by land.
Polytheism Belief in or worship of more than one god.
Popular culture Culture found in a large, heterogeneous society that shares certain habits and seeks similar material goods despite differences in other personal characteristics.
Population pyramid A bar graph that represents the distribution of population by age and sex.
Possibilism The theory that the physical environment may set limits on human actions, but people have the ability to adjust to the physical environment and choose a course of action from many alternatives.
Post-Fordist production Adoption by companies of flexible work rules, such as the allocation of workers to teams that perform a variety of tasks.
Post-structuralist geography Geographic approach that examines how the powerful in a society dominate, or seek to control, less powerful groups, how the dominated groups occupy space, and confrontations that result from the domination.
Potential reserve The amount of energy in deposits not yet identified but thought to exist.
Potential support ratio (or **elderly support ratio)** The number of working-age people (ages 15 to 64) divided by the number of persons 65 and older.
Preservation The maintenance of resources in their present condition with as little human impact as possible.
Primary sector The portion of the economy concerned with the direct extraction of materials from Earth, principally through agriculture.
Primate city The largest settlement in a country, if it has more than twice as many people as the second-ranking settlement.
Primate city rule A pattern of settlements in a country such that the largest settlement has more than twice as many people as the second-ranking settlement.
Prime meridian The meridian, designated as 0° longitude, that passes through the Royal Observatory at Greenwich, England.
Productivity The value of a particular product compared to the amount of labor needed to make it.
Projection A system used to transfer locations from Earth's surface to a flat map.
Pronatalist policy Government policy that supports higher birth rates.
Prorupted state An otherwise compact state with a large projecting extension.
Proven reserve The amount of a resource remaining in discovered deposits.
Public service A service offered by the government to provide security and protection for citizens and businesses.
Pull factor A reason that induces people to move to a new location.
Pupil/teacher ratio The number of enrolled students divided by the number of teachers.
Purchasing power parity (PPP) The amount of money needed in one country to purchase the same goods and services in another country.
Push factor A reason that induces people to leave old locations.

Q

Quaternary sector The portion of the economy concerned with information- and knowledge-based services.
Quinary sector The portion of the economy concerned with human services and hospitality.
Quota In reference to migration, a law that places maximum limits on the number of people who can immigrate to a country each year.

R

Race Identity with a group of people who are perceived to share a physiological trait, such as skin color.

Racism The belief that race is the primary determinant of human traits and capacities and that racial differences produce an inherent superiority of a particular race.

Racist A person who subscribes to the beliefs of racism.

Ranching A form of commercial agriculture in which livestock graze over an extensive area.

Range (of a service) The maximum distance people are willing to travel to use a service.

Rank-size rule A pattern of settlements in a country such that the nth largest settlement is 1/n the population of the largest settlement.

Ransomware (or **cryptoviral extortion)** A form of malware that encrypts the victim's computer files, making them inaccessible, until a ransom is paid to decrypt them.

Received Pronunciation (RP) The dialect of English commonly used by politicians, broadcasters, and actors in the United Kingdom.

Recycling The separation, collection, processing, marketing, and reuse of discarded material.

Redlining A process by which financial institutions draw red-colored lines on a map and refuse to lend money for people to purchase or improve property within the lines.

Refugee Someone who is forced to migrate from their home country and who cannot return to that home country for fear of persecution because of race, religion, nationality, membership in a social group, or political opinion.

Region An area distinguished by one or more distinctive characteristics.

Relic boundary A boundary that no longer functions but can still be detected on the cultural landscape.

Relocation diffusion The spread of a feature or trend through physical movement of people from one place to another.

Remanufacturing The rebuilding of a product to specifications of the original manufactured product using a combination of reused, repaired, and new parts.

Remittance Transfer of money by migrant workers from the country into which they immigrated to people in the country from which they emigrated.

Remote sensing The acquisition of data about Earth's surface from a satellite orbiting the planet or from other long-distance methods.

Renewable energy A source of energy that has a theoretically unlimited supply and is not depleted when used by people is renewable energy.

Renewable resource Something produced in nature more rapidly than it is consumed by humans.

Resource A substance in the environment that is useful to people, is economically and technologically feasible to access, and is socially acceptable to use.

Responsible tourism Tourism that minimizes negative economic, environmental, and social impacts and generates greater benefits for local people.

Ridge tillage A system of planting crops on ridge tops in order to reduce farm production costs and promote greater soil conservation.

Right-to-work law A U.S. law that prevents a union and a company from negotiating a contract that requires workers to join the union as a condition of employment.

Rural settlement A community where most people are engaged in agriculture.

Rush hour The four consecutive 15-minute periods in the morning and evening with the heaviest volumes of traffic.

S

Sanitary landfill A place to deposit solid waste at an isolated site in order to be degraded biologically, chemically, and physically, typically by bulldozing a layer of earth over garbage each day to reduce emissions of gases and odors from the decaying trash.

Sawah A flooded field for growing rice.

Scale The relationship between the portion of Earth being studied and Earth as a whole.

Second agricultural revolution An increase in agricultural productivity through improvement of crop rotation and breeding of livestock.

Secondary sector The portion of the economy concerned with manufacturing useful products through processing, transforming, and assembling raw materials.

Sector model A model of the internal structure of cities in which social groups are arranged around a series of sectors, or wedges, radiating out from the central business district.

Secular Attitudes or activities that have no religious or spiritual basis.

Self-determination The concept that ethnicities have the right to govern themselves.

Service Any activity that fulfills a human want or need and returns money to those who provide it.

Settlement A permanent collection of buildings and inhabitants.

Sex ratio The number of males per 100 females in the population.

Sharecropper A person who works fields rented from a landowner and pays the rent and repays the loans by turning over to the landowner a share of the crops.

Shifting cultivation A form of subsistence agriculture in which people shift activity from one field to another; each field is used for crops for a relatively few years and left fallow for a relatively long period.

Site The physical character of a place.

Site factors Location factors related to the costs of factors of production inside a plant, such as land, labor, and capital.

Situation (or **relative location)** The location of a place relative to another place.

Situation factors Location factors related to the transportation of materials into and from a factory.

Smart growth An approach to expanding urban areas in a manner that protects rural land for agriculture, recreation, and wildlife, by following ten development principles, including a mix of residential and commercial uses, a range of housing types, walkable neighborhoods, and compact design.

Social area analysis Statistical analysis used to identify where people of similar living standards, ethnic backgrounds, and lifestyles live within an urban area.

Social construction An idea or a meaning that is widely accepted as natural by a society but may not represent a reality shared by those outside the society.

Social heterogeneity People from varied racial, ethnic, and national backgrounds and with diverse lifestyle preferences.

Solar calendar A calendar that relates to the season or the apparent position of the sun in relation to the stars.

Solstice An astronomical event that happens twice each year, when the tilt of Earth's axis is most inclined toward or away from the Sun, causing the Sun's apparent position in the sky to reach its northernmost or southernmost extreme, and resulting in the shortest and longest days of the year.

Sovereignty Ability of a state to govern its territory free from control of its internal affairs by other states.

Space The physical gap or interval between two objects.

Space–time compression The reduction in the time it takes to diffuse something to a distant place as a result of improved communications and transportation systems.

Spanglish A combination of Spanish and English spoken by some Hispanic Americans.

Spatial association The relationship between the distribution of one feature and the distribution of another feature.

Sprawl Development of new housing sites at relatively low density and at locations that are not contiguous to the existing built-up area.

Stable language A language in daily use by people of all ages, from children to elderly individuals.

Standard language The form of a language used for official government, business, education, and mass communication.

State An area organized into a political unit and ruled by an established government that has control over its internal and foreign affairs.

Step migration Movement of people that follows a path of a series of stages or steps toward a final destination.
Stimulus diffusion The spread of an underlying principle.
Structural adjustment program Economic reforms that a developing country must adopt in order to secure financial support from the IMF, the World Bank, or a developed country.
Subdialect A subdivision of a dialect.
Subsequent boundary A boundary that is established after the settlement of an area and is changed to reflect developments such as war.
Subsistence agriculture Agriculture designed primarily to provide food for direct consumption by the farmer and the farmer's family.
Suburb A residential or commercial area situated within an urban area but outside the central city.
Superimposed boundary A boundary drawn on an area by a conquering or colonizing power that ignores existing cultural patterns.
Supply The quantity of something that producers have available for sale.
Sustainability The use of Earth's renewable and nonrenewable natural resources in ways that do not constrain resource use in the future.
Sustainable development Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Sustainable Development Goals Seventeen goals adopted by the U.N. in 2015 to reduce disparities between developed and developing countries by 2030.
Syncretic Combining several religious traditions.
Syncretism The combining of elements of two groups into a new cultural feature.

T

Taboo A restriction on behavior imposed by social custom.
Terroir The contribution of a location's distinctive environment to the way food produced there tastes.
Terrorism The threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation.
Tertiary sector The portion of the economy concerned with the provision of goods and services to people in exchange for payment.
Textile A fabric made by weaving, used in making clothing.
Third agricultural revolution (or **green revolution)** Rapid diffusion of new agricultural technology, especially new high-yield seeds and fertilizers.
Threshold The minimum number of people needed to support a service.
Tidal power The conversion of energy generated by tidal flows into electricity.
Toponym The name given to a portion of Earth's surface.
Total fertility rate (TFR) The average number of children a woman will have throughout her childbearing years.
Transhumance Seasonal migration of livestock between mountain and lowland pasture area.
Transnational corporation A company that conducts research, operates factories, and sells products in many countries, not just where its headquarters or shareholders are located.
Triangular slave trade A practice, primarily during the eighteenth century, in which ships left Europe for Africa with cloth and other goods used to buy people. The same ships transported these enslaved people across the Atlantic. Completing the triangle, the ships returned to Europe with sugar and molasses.
Trolling The practice of posting deliberately inflammatory, extraneous, or off-topic messages in social media in order to provoke quarrels or otherwise upset people.
Truck farming Commercial gardening, so named for the Middle English word *truck*, meaning "barter" or "exchange of commodities."

U

Unauthorized immigrant A person who enters a country without proper documents to do so.
Undernourishment Dietary energy consumption that is continuously below the minimum requirement for maintaining a healthy life and carrying out light physical activity.
Uneven development The increasing gap in economic conditions between core and peripheral regions as a result of the globalization of the economy.
Unitary state An internal organization of a state that places most power in the hands of central government officials.
Universalizing religion A religion that attempts to appeal to all people, not just those living in a particular location.
Urban area A term to describe a central city in the United States and its surrounding built-up suburbs.
Urban cluster A term no longer used to describe an urban area in the United States with between 2,500 and 50,000 inhabitants.
Urban growth boundary Delineation of a boundary around an urban area within which new development must occur.
Urban settlement A community where people are employed in secondary- and tertiary-sector jobs.
Urbanization An increase in the percentage and in the number of people living in urban settlements.
Urbanized area A term no longer used to describe an urban area in the United States with at least 50,000 inhabitants.
Utopian settlement A community built around an ideal way of life, often based on a religion.

V

Varna The traditional caste system in India that once allocated people to one of four social classes.
Vernacular region (or **perceptual region)** An area that people believe exists as part of their cultural identity.
Vertical integration An approach typical of traditional mass production in which a company controls all phases of a highly complex production process.
Voluntary migration Permanent movement of people undertaken by choice.
Volunteered geographic information (VGI) Creation and dissemination of geographic data contributed voluntarily and for free by individuals.
Voluntourism A form of tourism in which travelers participate in voluntary work, typically for a nonprofit organization.

W

Weapon of mass destruction A nuclear, biological, chemical, or other weapon that can kill and bring significant harm to a large number of humans or cause great damage to human-made structures, natural structures, or the biosphere.
Web application attack An exploitation of a vulnerability in the coding of an app in order to gain access to a database.
Wet rice Rice planted on dry land in a nursery and then moved to a deliberately flooded field to promote growth.
Working language A language designated by an international organization or corporation as its primary means of communication for daily correspondence and conversation.
World-systems theory A theory developed by Immanuel Wallerstein that in an increasingly unified world economy developed countries form an inner core area whereas developing countries are found on the periphery and semi-periphery.

X

Xenophobia Fear of people who are from other countries.

Z

Zero population growth A decline of the total fertility rate to the point where the natural increase rate equals zero.
Zoning ordinance A law that limits the permitted uses of land and maximum density of development in a community.

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North Cape
Lapland
ICELAND
Faroe Is.
Scandinavia
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ALPS
Iberian Peninsula
Azores
Balkan Peninsula
Taymyr Peninsula
SIBERIA
Central Siberian Plateau
VERKHOYANSK RANGE
KOLYMA RANGE
West Siberian Plain
URAL MTS.
RUSSIA
Sea of Okhotsk
Kamchatka Peninsula
Kuril Is.
Kuril Tr.
Emperor Seamounts
Caspian Depression
KAZAKHSTAN
Aral Sea
YABLONOVY RANGE
ALTAY MTS.
MONGOLIA
GOBI (DESERT)
CAUCASUS MTS.
GEORGIA
ARMENIA
Anatolia
TÜRKIYE
AZERBAIJAN
TURKMENISTAN
UZBEKISTAN
TIAN SHAN
KYRGYZSTAN
TAJIKISTAN
Taklimakan Desert
CHINA
NORTH KOREA
SOUTH KOREA
JAPAN
Sea of Japan (East Sea)
Northwest Pacific Basin
PACIFIC OCEAN
ATLAS MTS.
MOROCCO
Canary Is.
TUNISIA
LEBANON
SYRIA
ISRAEL
JORDAN
Gaza Strip
West Bank
IRAQ
ZAGROS MTS.
ELBURZ MTS.
Iranian Plateau
IRAN
KUWAIT
BAHRAIN
QATAR
HINDU KUSH
AFGHANISTAN
PAKISTAN
HIMALAYAS
NEPAL
BHUTAN
East China Sea
Ryukyu Trench
ALGERIA
LIBYA
SAHARA
EGYPT
SAUDI ARABIA
UNITED ARAB EMIRATES
OMAN
Thar Desert
BANGLADESH
INDIA
Deccan Plateau
WESTERN GHATS
EASTERN GHATS
MYANMAR
LAOS
THAILAND
VIETNAM
CAMBODIA
PHILIPPINES
TAIWAN
Northern Mariana Is.
Wake Island
Guam
Mariana Trench
Philippine Trench
Cape Verde Plain
Western Sahara
Ahaggar
Tibesti
Air
CABO VERDE
MAURITANIA
MALI
SAHEL
NIGER
CHAD
SUDAN
ERITREA
YEMEN
Arabian Sea
Bay of Bengal
South China Sea
SENEGAL
THE GAMBIA
GUINEA-BISSAU
GUINEA
BURKINA FASO
BENIN
GHANA
NIGERIA
SIERRA LEONE
LIBERIA
CÔTE D'IVORE
TOGO
CAMEROON
CENTRAL AFRICAN REP.
SOUTH SUDAN
DJIBOUTI
Ethiopian Highlands
Horn of Africa
ETHIOPIA
SOMALIA
Great Rift Valley
SÃO TOMÉ AND PRÍNCIPE
EQUATORIAL GUINEA
GABON
REP. OF THE CONGO
Congo Basin
DEM. REP. OF THE CONGO
UGANDA
RWANDA
KENYA
BURUNDI
TANZANIA
SEYCHELLES
Somali Basin
MALDIVES
SRI LANKA
BRUNEI
MALAYSIA
SINGAPORE
INDONESIA
PALAU
FEDERATED STATES OF MICRONESIA
MARSHALL ISLANDS
NAURU
KIRIBATI
Central Pacific Basin
Equator
PAPUA NEW GUINEA
TIMOR-LESTE
SOLOMON ISLANDS
TUVALU
VANUATU
FIJI
New Hebrides Tr.
Cape York
GREAT DIVIDING RANGE
Mid-Atlantic Ridge
Mid-Indian Ridge
Mid-Indian Basin
Ninetyeast Ridge
Cocos (Keeling) Islands
Christmas Island
Katanga Plateau
ANGOLA
ZAMBIA
MALAWI
Mayotte
COMOROS
MOZAMBIQUE
MADAGASCAR
MAURITIUS
Réunion
St. Helena
NAMIBIA
Namib Desert
ZIMBABWE
BOTSWANA
Kalahari Desert
ESWATINI
LESOTHO
SOUTH AFRICA
Walvis Ridge
Cape Plain
Cape of Good Hope
Agulhas Plateau
Southwest Indian Ridge
ATLANTIC OCEAN
INDIAN OCEAN
Broken Ridge
Perth Basin
Great Sandy Desert
Western Plateau
AUSTRALIA
Great Victoria Desert
Simpson Desert
South Australian Basin
Tasman Sea
NEW ZEALAND
New Caledonia
Norfolk Island
0 1,000 2,000 Miles
0 1,000 2,000 Kilometers
Weddell Plain
ANTARCTICA

Europe

0 250 500 Miles
0 250 500 Kilometers
NORWAY
FINLAND
SWEDEN
ESTONIA
LATVIA
LITHUANIA
RUSSIA
Baltic Sea
North Sea
IRELAND
UNITED KINGDOM
DENMARK
NETHERLANDS
BELGIUM
GERMANY
POLAND
BELARUS
Channel Islands
ATLANTIC OCEAN
LUXEMBOURG
FRANCE
LIECHTENSTEIN
CZECHIA
SLOVAKIA
UKRAINE
MOLDOVA
SWITZERLAND
AUSTRIA
HUNGARY
SLOVENIA
ROMANIA
MONACO
SAN MARINO
CROATIA
BOSNIA AND HERZEGOVINA
SERBIA
Black Sea
GEORGIA
ANDORRA
PORTUGAL
SPAIN
ITALY
Corsica
Sardinia
Balearic Is.
MONTENEGRO
BULGARIA
KOSOVO
NORTH MACEDONIA
ALBANIA
VATICAN CITY
GREECE
TÜRKIYE
Mediterranean Sea
Sicily
MOROCCO
ALGERIA
TUNISIA
MALTA
Crete
CYPRUS
LEBANON
SYRIA

Earth at Night, City Lights

North America and Latin America

These images of Earth at night from NASA's Suomi-NPP "Marble" series use a collection of satellite-based observations, stitched together in a seamless mosaic of our planet. This view is based on instrumentation that observes light emanating from the ground. Notice how strongly major population clusters show up in the image.

Africa, Europe, and southern and western Asia

Defense Meteorological Satellite Program (DMSP) NASA/GSFC